Volume 39 · Part 9 · September 1960

REVIEW OF APPLIED MYCOLOGY

COMPILED FROM WORLD LITERATURE ON PLANT PATHOLOGY AND APPLIED MYCOLOGY

RECENT PUBLICATIONS

HERB. I.M.I. HANDBOOK
Methods in use at the Commonwealth Mycological Institute
103 pp., 6 plates, 8 fig., 1960
Price 12*s* 6*d.* post free

CLUB ROOT DISEASE OF CRUCIFERS CAUSED BY PLASMODIOPHORA BRASSICAE WORON.
By John Colhoun. 108 pp., 4 fig., 1958
Price 20*s.* post free

AN ANNOTATED LIST OF SEED-BORNE DISEASES
By Mary Noble, J. de Tempe, & P. Neergaard. 163 pp. and Index
Price 20*s.* post free

In advanced preparation—DISEASES OF SORGHUM by S. A. J. Tarr
—Details later.

COMMONWEALTH MYCOLOGICAL INSTITUTE
KEW · SURREY

Price 6*s. net*

COMMONWEALTH MYCOLOGICAL INSTITUTE

EXECUTIVE COUNCIL: A. Perera (*Chairman*), Ceylon; C. K. Reheem (*Vice-Chairman*), Pakistan; W. G. Alexander, C.B.E., United Kingdom; J. G. Malloch, M.B.E., PH.D., Canada; E. J. Drake, Australia; V. Armstrong, PH.D., New Zealand; J. F. Brooks, Union of South Africa; S. Krishnamurti, India; W. W. K. Vanderpuye, Ghana; J. D. de Silva, Federation of Malaya; J. E. C. Coventry, Federation of Rhodesia and Nyasaland; C. E. Lambert, C.M.G., Colonial Territories.

Secretary: Sir Herbert Howard.

STAFF: *Director and Editor*: J. C. F. Hopkins, D.SC., A.I.C.T.A. *Assistant Director*: H. A. Dade, A.R.C.S. *Mycologist*: M. B. Ellis, PH.D.; *Assistant Editors*: G. C. Ainsworth, PH.D.; Grace M. Waterhouse, M.SC. *Assistant Mycologists*: C. Booth, M.SC., PH.D.; R. R. Davies, PH.D.; F. C. Deighton, O.B.E., M.A.; J. J. Elphick, B.SC.; K. A. Pirozynski, B.SC.; G. F. Laundon, B.SC.; B. C. Sutton, B.SC. *Bacteriologist*: A. C. Hayward, PH.D. *Sub-Editors*: E. B. Martyn, B.A., A.I.C.T.A.; D. Jean Stamps, PH.D. *Colonial Pool of Plant Pathologists*: R. A. Altson, B.SC., A.R.C.S.; P. Holliday, M.A.; B. E. J. Wheeler, PH.D.

SULPHATE OF COPPER

98/100% PURITY

CRYSTALS AND POWDER

FUNGUS DISEASES

Control and prevent by spraying with Bordeaux Mixture made with the best quality Sulphate of Copper.

COPPER DEFICIENCY

Sulphate of Copper in powder form is also widely used for the correction of Copper Deficiency of the soil and in animal nutrition.

BRITISH SULPHATE OF COPPER ASSOCIATION (EXPORT) LTD.

1 GREAT CUMBERLAND PLACE, LONDON, W.1

Telegrams: Britsulcop, Wesphone, London

Telephone: Paddington 5068/9

OTHER COMMONWEALTH AGRICULTURAL BUREAUX JOURNALS OF INTEREST TO PLANT PATHOLOGISTS

The literature on agricultural insect pests is abstracted in the *Review of Applied Entomology*, Series A, and that on plant pathogenic nematodes in *Helminthological Abstracts*. Additional references to deficiency diseases will be found in *Soils & Fertilizers*, to plant breeding in relation to disease in *Plant Breeding Abstracts*, and to forestry problems in *Forestry Abstracts*. All these journals except the first are obtainable from Central Sales Dept, Farnham House, Farnham Royal, Bucks. The *Review of Applied Entomology* is sold by the Commonwealth Institute of Entomology, 56 Queen's Gate, London, S.W. 7.

PRINTED IN GREAT BRITAIN AT THE UNIVERSITY PRESS, OXFORD, BY VIVIAN RIDLER, PRINTER TO THE UNIVERSITY

C. A. B.
6 OCT 1960
FILE

Pimenova (Mme A. S.). Повышение и сохранение устойчивости овощных культур к заболеваниям. [The increase and preservation of disease resistance in vegetable crops.]—*Ex* Достижения по растениеводству [Achievements in plant growing], pp. 348–352, 3 fig., State publishers of agric. Literature, Moscow, 1958. Roubles 18.30.

Some of this information from the Gribovskaya Vegetable Selection Sta. on tomato streak virus [cf. **38**, 374] has been noticed [**35**, 245]. Slime bacteriosis [cf. **35**, 255] was also studied at the Sta. and on seed farms of the Kuntsevskiĭ area. Various bacteria, which do not appear to be obligate parasites, are associated, colonizing weakened or mechanically damaged plants.

Croxall (H. E.). **Club root of Brassicae.**—*N.A.A.S. quart. Rev.*, **45**, pp. 20–24, 1959. [11 ref.]

This useful review [cf. **37**, 746; **38**, 636] deals with important factors in infection by *Plasmodiophora brassicae* and their interaction, e.g. number of spores/unit of soil, soil moisture, soil temp., and soil acidity [cf. **39**, 455], and also covers preventive action by cultural methods, the use of resistant crops in rotations, and chemical control. In an acid soil, with soil moisture and temp. favouring infection, spore concs. of 1,000–25,000/g. soil do not affect the number of plants attacked [**33**, 192], though some workers have found that the spore conc. required to cause severe infection varies with the type of soil [cf. below]. Soil at approx. 70–80% of its water-retaining capacity appears to provide the opt. moisture for infection. In acid soils the min. temp. for attack appears to lie between 10–15° C., the max. between 30–35°, and the opt. between 20–25°; in alkaline soils the temp. range is less.

Kale is rarely injured by the disease and may replace turnips and swedes in the rotation. On land in which losses are likely the turnip vars. The Bruce and The Wallace may be used. Strs. of the Wilhemsburger swede have some resistance, but are not immune. Imported vars. of cauliflower, broccoli, cabbage, and sprouts which have displayed resistance in their country of origin have invariably failed when exposed to severe infection in Great Britain.

Bochow (H.). **Zur Anwendung des Wurzelhaarinfektiontestes bei Plasmodiophora brassicae Wor.** [The application of the root hair infection test for *P. brassicae*.] —*Phytopath. Z.*, **37**, 3, pp. 236–244, 5 fig., 2 graphs, 1960. [Engl. summ.]

It was determined at the Inst. Phytopath. Pflanzenschutz, Univ. Rostock, Germany, that the number of primary infections by *P. brassicae* [cf. **38**, 43] in the root hairs of the host (in these tests Maleksberger Gelb mustard) is extremely variable even when the experimental conditions are kept constant. Results of infection can therefore be evaluated only relatively. Numerical differences in root hair infections are regarded mainly as the result of differences in germination of the fungus. Questions concerning the technique of carrying out and evaluating root hair infection tests in ecological investigations are discussed.

Maklakova (Mme G. F.). Кила (**Plasmodiophora brassicae Wor.**) на сорняках из семейства крестоцветных (**Cruciferae**). [Club root (*P. brassicae*) on the weeds of the family Cruciferae.]—*Bot. Zh. S.S.S.R.*, **44**, 11, pp. 1649–1653, 2 fig., 1959.

In further studies [**39**, 64] at the All-Union Inst. of Plant Protection, Leningrad, field mustard (*Sinapsis arvensis*) and wild radish (*Raphanus raphanistrum*) were

found more susceptible to club root than other weed spp. (up to 19 and 9%, respectively). Frequent galls on wild radish, caused by the larvae of *Ceuthorhynchus pleurostigma* and strongly reminiscent of club root, were shown to be independent of fungal infection. Though clubs on the 2 named spp. were relatively small, a large number of such plants would be a considerable danger to cabbage and swede seedlings planted in the fields. To prevent infection in nurseries and hotbeds, the use of turf soil from meadows, which is free from the fungus, is recommended.

McMeekin (Dorothy). **The role of the oospores of Peronospora parasitica in downy mildew of crucifers.**—*Phytopathology*, **50**, 2, pp. 93–97, 1 fig., 1960.

At Cornell Univ. Ithaca, N.Y., conidia of *P. parasitica* from field-grown broccoli and cabbage [cf. **37**, 611] in which abundant oospores were found, were inoculated on to the cotyledons of cabbage seedlings grown aseptically [cf. **38**, 553]. In 7 days oogonia were observed, with antheridia that were long and tendril-like, thus somewhat different from earlier descriptions. Conditions (light, temp., and age and nutrition of the host) promoting senescence of the leaf generally favoured oospore formation so long as both antheridial and oogonial strs. were present. Oospores were not formed at the expense of conidia. Maintenance of the fungus on plants under lab. conditions tended to select one kind of str. but not more often than the other. Oospores kept for 5 months at various temps. (−10 to 27° C.) failed to germinate on a dung infusion, 0·04% $KMnO_4$, or a leachate of soil that had carried cabbages, though there were changes in permeability of the wall.

Heitefuss (R.) & Fuchs (W. H.). **Untersuchungen zur pathologischen Physiologie von Peronospora brassicae (Gäum.) auf Brassica oleracea.** [Studies on the pathological physiology of *P. parasitica* on *B. oleracea*.]—*Phytopath. Z.*, **37**, 4, pp. 348–378, 3 graphs, 1960. [Engl. summ. 75 ref.]

In these studies at the Inst. fur Pflanzenpathologie und Pflanzenschutz, Univ. Göttingen, Germany, development of *P. parasitica* [**38**, 553] on cabbage was considerably reduced by vacuum infiltration of 10^{-1} M thiosemicarbacide, 10^{-2} M and 10^{-1} M ethylurethane, and completely inhibited by 5×10^{-3} M fluoracetate. An approx. 10% decrease in malic acid-dehydrogenase activity was perhaps partly responsible for the increase in malic acid after infection, but there was no correlation between the amount of malic acid and enzyme activity. The O uptake by healthy leaves is more or less reduced by substances inhibiting the disease. The action of fluoracetate depends largely on the environment, especially light intensity during growth. The respiratory rate in infected leaves is about 50–100% higher than in normal ones. The tricarbonic acid cycle seems to contribute a smaller percentage to this increased respiration than it does in healthy plants.

Heitefuss (R.), Buchanan-Davidson (D. J.), Stahmann (M. A.), & Walker (J. C.). **Electrophoretic and immunochemical studies of proteins in Cabbage infected with Fusarium oxysporum f. conglutinans.**—*Phytopathology*, **50**, 3, pp. 198–205, 2 fig., 1 graph, 1960. [24 ref.]

Further studies at Univ. Wis. [cf. **38**, 228] concerned the cytoplasmic proteins of resistant (Jersey Queen) and susceptible (Early Jersey Wakefield) cabbage plants before and after inoculation with *F.o.* f. *conglutinans* [*F. conglutinans*]. Electrophoresis in starch gel separated 4 components from protein extracts of such plants, but no significant differences correlated with resistance or infection were evident. Immunochemical analysis, however, with rabbit antisera (*Arch. Biochem.*, **83**, pp. 200–208, 1959) showed as many as 7 components in extracts of infected susceptible cabbage, compared with 4 in the others (susceptible and resistant healthy and resistant inoculated). Further experiments suggested that these additional compounds, which were not original fungus protein and do not appear merely to be

breakdown products are, in fact, antigenic substances, probably proteins, and distinct from those found in the healthy plant.

GARRIGUES (R.) & FAUREL (L.). **Étude d'une intumescence nouvelle du Chou-rouge.** [A study of a new intumescence of red Cabbage.]—*Bull. Soc. Hist. nat. Afr. N.*, **50**, 3–4, pp. 114–125, 7 fig., 1959.

In March 1957 the leaves of red cabbages marketed in Algiers were found to bear small whitish excrescences, which were also prevalent in several market gardens near the city. The general health of the plants appeared to be unimpaired. No local focus of infection appeared to be involved and no fungi or bacteria were found in or near the tumours, though thrips were often present. The condition is provisionally attributed to a virus.

STALDER (L.) & NIKLAUS (L.). **Eine für die Schweiz neue Krankheit an Kohlgewächsen.** [A disease of Brassicas new for Switzerland.]—*Gemüsebau*, **1**, pp. 3–8, 5 fig., 1959.

In 1956 cabbage plants infected by *Phoma lingam* [map 73] were sent to the Eidg. Versuchsanstalt für Obst-, Wein- und Gartenbau, Wädenswil, from the Kanton of Thurgau, where losses in affected crops had reached 30–40%. In 1957 the disease occurred in several more regions. Seed transmission was demonstrated [cf. **39**, 201]. The control measures provisionally recommended comprise warm-water treatment of seed (50° C. for 20–25 min.) or soaking in 0·25–0·5% ceretan for 30 min., and attention to crop rotation.

MCLEAN (D. M.). **Sclerotinia stalk rot of Cabbage seed plants.**—*Sta. Circ. Wash. agric. Exp. Sta.* 359, 4 pp., 4 fig., 1959.

The control of stalk rot or 'white blight' (*S. sclerotiorum*) [**29**, 341; **37**, 610] of seed cabbages in western Washington by applying calcium cyanamide to the soil is described. A single application of 800–1,000 lb. of granular cyanamide/acre with a fan-type distributor at the time when the crop is from waist to shoulder high is recommended.

YANG (S.-M.). **An investigation on the host range and some ecological aspects on the Sclerotinia disease of the Rape plant.**—*Acta phytopath. sinica*, **5**, 2, pp. 111–122, 5 fig., 2 graphs, 1959. [Chin. Abs. from Engl. summ.]

This survey by Hua-Zhong Coll. Agric. disclosed 71 hosts of *S. sclerotiorum* [cf. **38**, 343] locally, including rape, groundnut, soybean [cf. **6**, 74], sunflower, and many vegetables and ornamental plants; 13 are new host records, and 5 spp., known as hosts elsewhere, are not affected in China. The main areas of occurrence, the Yang-Tze Valley and the S.E. coastal provinces, are characterized by heavy rainfall (av. > 100 mm./month), concurrent with the susceptible stage of the hosts (usually the flowering period), and the relatively cool temp. (ca. 15° C.) necessary for germination of apothecia. These usually appear in autumn and, in larger quantities, in spring. Sclerotia grow much more rapidly from mass culture than from single spores, which indicates a facultative heterothallic nature. Abundant spring and autumn rain and a cold wind at flowering stimulate the growth of sclerotia, whereas rain in summer causes their decay. The ascospores germinate at a high R.H. even on a dry slide, and tolerate a wide temp. range (over 50% germination in less than 24 hr. at 5–30° C.) with opt. at 5–10° C. Flower petals of rape were readily attacked by ascospores, leaves only if chilled.

WENHAM (H. T.). **Black root disease of Radishes caused by Aphanomyces raphani Kendr.**—*N.Z.J. agric. Res.*, **3**, 1, pp. 179–184, 4 fig., 1960.

A record from Massey agric. Coll., Palmerston North, of the disease in the Mana-

watu. It is known in Ill., Iowa, and Ind. in the U.S.A. [7, 4], and in Canada, Germany [**32**, 293], and Australia. The symptoms in N.Z. had previously been attributed to B deficiency.

HULL (R.). **Sugar Beet yellows in Great Britain, 1958.**—*Plant Path.*, **8**, 4, p. 145, 1959.

In 147 fields sampled averages of 0·3, 4·2, 14·1, and 20·7% of the sugar beet plants were affected by yellows virus [cf. **38**, 234] at the end of June, July, Aug., and Sept., respectively. For the whole crop (413,700 acres) 20·3% were with < 1% infected plants at the end of Aug., 58·3% with 1–20%, 17·3% with 21–60%, and 4·1% with over 60%. The loss of root yield was estimated at 336,000 tons. The av. root yield (13·9 tons/acre) was the heaviest recorded in Great Britain, but the sugar content was only 15·08%, and the sugar yield (2·09 cwt./acre) was exceeded in 1950 and 1953. The estimated potential yield of roots/acre at 16% sugar content was 13·89 tons, exceeded only in 1950.

About 100,000 acres of sugar beet were sprayed [**39**, 201]. At the end of Sept. yellows incidence was (on av.) 2½ times more in unsprayed than in sprayed fields in the same area. One spraying increased yields by an av. of 7–8% in crops with yellows.

WIESNER (K.). **Ein Beitrag zur Epidemiologie der virösen Rübenvergilbung (Corium betae Holmes) in der Deutschen Demokratischen Republik.** [A contribution to the epidemiology of Beet yellows virus in Germany.]—*Wiss. Z. Martin-Luther-Univ.*, **8**, 4–5, pp. 577–630, 11 fig., 5 maps, 76 graphs, 1959. [3 pp. ref.]

Seed beet is the most important overwintering host of the virus. In 1955, a year of high incidence, infection of the seed crop of sugar beet was on av. 16·1%, and of fodder beet 36·7% [cf. **39**, 449]. Weeds are of very minor significance; of 294 plants examined, representing 34 spp., only 9·5% were infected. Passage through *Capsella bursa-pastoris* and *Thlaspi arvense* resulted in loss of virulence. In greenhouse inoculation tests with 73 plant spp. of 17 families 27 spp. (Aizoaceae, Amaranthaceae, Caryophyllaceae, Chenopodiaceae, and Convolvulaceae) developed symptoms. The virus could be transmitted to beet from all but 4 of these.

First infections of the crops occurred with the 1st summer flight of *Doralis* [*Aphis*] *fabae* from the seed crop. During 1954–57 the main concentration of the disease was S. and E. of Leipzig.

BERCKS (R.) & STELLMACH (G.). **Über die serologische Nachweismöglichkeit des Vergilbungsvirus in Freilandpflanzen von Zucker- und Futterrüben.** [On the possibility of the serological demonstration of yellows virus in field plants of Sugar and Fodder Beet.] —*NachrBl. dtsch. PflSchDienst, Stuttgart*, **11**, 11, pp. 170–172, 1959. [Engl. summ.]

The 3-yr. experiment here reported from the Institut für Virusserologie, Brunswick, confirmed the results of earlier tests with Kleinwanzleben E [**35**, 804; **38**, 46]. The same var. was used with 9 others, and Rubensorte 1 as a standard. In the 1st yr. it was confirmed that infection by viruliferous *Myzodes* [*Myzus*] *persicae* was successful under glass. In the 2nd yr. seed was sown in the field in late Apr., and the plants were infected at 8 weeks by introducing 10–20 aphids on a piece of infected leaf among the heart leaves. Serological testing of young, intermediate, and old leaves 4 weeks later revealed infection levels ranging from 36 to 67% (av. 54%). Over the period Oct.–Dec. the virus was detectable in all young and intermediate leaves, the titres being generally higher in the latter. Av. titres corresponded with those of Kleinwanzlebener E in the earlier experiment [loc. cit.].

In the 3rd yr. initial inoculation was heavier (50 aphids) in some of the plots,

which were on this occasion arranged in randomized blocks. Virus titres were significantly higher where more aphids had been used, and again the intermediate leaves had higher titres than the young. The titres of the young leaves of some vars. were significantly different from the standard var., but no general conclusion could be drawn as to the comparative susceptibility of the vars.

Goryushyn (V. A.). Шляхи поширення вірусу жовтяниці Цукрових Буряків. [Means of dissemination of Sugar Beet yellows virus.]—*J. Microbiol., Kiev*, **21**, 5, pp. 40–46, 1 fig., 2 graphs, 1959. [Russ. summ.]

Doralis [*Aphis*] *fabae* is the principal vector of sugar beet yellows [cf. **39**, 450] in the Ukraine. At the Inst. Microbiol., Kiev, seed transmission could not be established. Beet mosaic virus is less widely disseminated. Yellows is retained for longer in the vector than mosaic which seems to be quickly inactivated.

Goryushyn (V. A.). Розподілення вірусу жовтяниці в хворій рослині Цукрового Буряка. [The distribution of yellows virus in diseased Sugar Beet plants.]—*Rep. Acad. Sci. Ukr., 1960*, 1, pp. 97–99, 1 fig., 1960. [Russ., Engl. summ.]

Further serological studies [cf. above] showed that the lowest leaves of 1-yr.-old sugar beet plants infected by yellows had the highest virus content, though in severe infection when the outer leaves die, this is true of the middle leaves. The least virus is found in the upper leaves and there is little in the roots. In 2-yr.-old beets at the leaf rosette stage the greatest conc. is in the lower leaves, but during flowering and seed formation it is in the middle and upper leaves. The upper part of the leaf blade has the most virus, more being present in the leaf mesophyll than in the veins; there is none in the stalk. Green seeds have a low virus content and mature seeds none.

Chiu (W.-F.), Chang (I.-H.), Hsieh (C.-C.), Cheo (Y.), & Hang (S.-Y.). **On the epiphytotics of Sugarbeet yellows in Inner Mongolia.**—*Acta phytopath. sinica*, **5**, 2, pp. 53–64, 2 diag., 1 graph, 1959. [29 ref. Chin. Abs. from Engl. summ.]

This report from the Univ. Agric., Peking, and Sugar Beet exp. Sta., Inner Mongolia, notes a beet yellows virus epidemic [map 261] on beet, a fairly recent introduction, in the Sarcin area in 1956, when incidence was 50–90% compared with 10–20% normally. The virus was transmitted by *Myzus persicae* and the symptoms appeared from mid-June to early July, after 30 days' incubation, and developed fully by mid-Aug. or early Sept. In 1953 the var. Aj_3 showed 13·2% loss of sucrose and PZHR a 27·7–31·4% loss in 1954 and a 25% av. loss in root wt. in 1956. Seed plants were the source of primary infection and should be kept 10 km. away from other beet plantations.

Kerssen (Miss M. C.). **Aphid control in Beets by means of aircraft.**—*Agric. Aviation*, **2**, 1, pp. 21–24, 1 graph, 1960.

This is an interesting review from the Inst. for phytopath. Res., Wageningen, of some experimental spraying in the Netherlands against *Aphis fabae* and *Myzus persicae*, vectors of beet yellows virus.

Münster (J.) & Joseph (E.). **Lutte contre la jaunisse sur Betteraves sucrières à l'aide de traitements systémiques préventifs.** [Control of Sugar Beet yellows by systemic preventive treatments.]—*Annu. agric. Suisse*, (**73**, éd fr. **60**), N.S. **8**, 6, pp. 579–595, 2 graphs, 1 map, 1959. [Germ., Engl., Ital. summ.]

In a trial over 2 yr. in the Marin-Wavre district, near Neuchâtel, subject annually to heavy attacks of beet yellows virus [**38**, 379], successful control, with reduction of infection from 67·2% (untreated) to 6·5% in one case, and from 40% to 5·9% in another, was obtained by spraying with thiometone (ekatine) at 2 l./ha (in 700 l.

spray) at the first appearance of winged *Myzus persicae*, with another application (1 l.) 6–12 days later, the interval depending on the progress of the aphids in the treated field [cf. **39**, 137].

Esau (Katherine). **Cytologic and histologic symptoms of Beet yellows.**—*Virology*, **10**, 1, pp. 73–85, 28 fig., 1960.

At the Dept Bot., Univ. Calif., Davis, sugar beet and New Zealand spinach, infected by beet yellows virus, were found to have characteristic inclusions which, under the light microscope, appear to be granular-alveolate, or fibrous, or to be composed of a series of parallel bands, possibly arranged spirally. They occur most consistently in the phloem parenchyma and the companion cells and may be present in these cells in the absence of any other symptom. Necrosis is the final stage in the degeneration of affected cells, and is typically seen in the aforementioned phloem elements and in the sieve tubes. External symptoms are correlated with abnormalities in the mesophyll and vein parenchyma.

Hills (O. A.), Bennett (C. W.), Jewell (H. K.), Coudriet (D. L.), & Brubaker (R. W.). **Effect of virus yellows on yield and quality of Beet seed.**—*J. econ. Ent.*, **53**, 1, pp. 162–164, 1 fig., 1960.

A report is given of studies since 1955 on the development of beet yellows virus (with some attention also to curly top virus) in the extensive seed-producing area of the Salt River Valley, Arizona. In 2 of 3 tests the yellows and curly top viruses together caused significant reductions in germination (from 76 to 21 and 71 to 29%), while the corresponding reductions in gm. seed/plant were from 77 to 32 and 41 to 13 [cf. **39**, 256]. Reductions in seed weight were also caused by each virus alone and of germination by yellows in 1 out of 4 tests. Following transmission of yellows by *Myzus persicae* yield reductions occurred in all plots, early infections (20 Nov.) being responsible for heavier losses (1,497 lb./acre) than late (21 Apr.) ones (310 lb.). Germination was reduced by inoculation at flowering (21 Apr.) and in early spring (21 Feb.).

Feltz (H.) & Marx (Ruth). **Zur Mosaikresistenz bei Zuckerrüben. (Vorläufige Mitteilung.)** [On mosaic resistance in Sugar Beets. Preliminary note.]—*Zucker*, **13**, 7, pp. 165–168, 2 diag., 1960. [Fr., Engl. summ.]

In field experiments from 1954 to 1959 at the Zweigstelle Rosenhof des Max-Planck-Instituts für Züchtungsforschung, Rosenhof bei Heidelberg, Germany [**39**, 256], individual plants among various selected strs. of 80 indigenous and foreign commercial vars. displayed resistance to infection with beet mosaic and yellows viruses by *Myzodes* [*Myzus*] *persicae* [**37**, 385, 614]. The character was shown to be genetically conditioned but its mode of inheritance was not determined.

Selection for mosaic resistance was based on foliar symptoms and confirmed by reinoculations, corroborated by the results of electron-microscopic studies. The mosaic-resistant plants originated almost exclusively in families with a comparable reaction to yellows and *Cercospora beticola* [cf. **39**, 202 *et passim*].

Giddings (N. J.). **The stability of Sugarbeet curly top virus strains.**—*J. Amer. Soc. Sug. Beet Technol.*, **10**, 4, pp. 359–363, 1959.

Tests at U.S. Dept Agric., Riverside, Calif., showed high stability of several strs. of curly top virus [cf. **34**, 12] of differing virulence on common vars. of sugar beet and a failure to produce mutants by successive selections over 14 months and by transfers from newly infected young tissue. Factors favouring development of new strs. seem to be a notably wide host range, mixed infection with other viruses, and the effect of environmental factors such as temp.

Digitized by the Internet Archive
in 2025

https://archive.org/details/review-of-plant-pathology_1960-09_39_part-9

interpreted as expressing a juvenile resistance to the disease. The appearance of the disease in successive periods must be related to variation in the degree of resistance of the leaves. In the 1st phase of growth the leaves cannot be the seat of infection. The spread in the 1st period in proportion to the age of the plant must be related to the differing micro-environments of plants at different ages, the size of the leaf rosette and consequent increased infection thereon as the fungus spreads, the varying inoculum levels on different plants owing to infection in successive periods, and probably to the difference in susceptibility of leaves of various ages.

Sevost'yanov (S. P.) & Eletskaya (Mme L. E.). Особенности выведения церкоспороустойчивого сорта Сахарной Свеклы II 028. [Breeding features of Sugar Beet var. P 028 resistant to cercosporosis.]—*Agrobiology, Moscow, 1959*, 6, pp. 908–911, 1959.

The All-Union sci. Res. Inst. for Sugar Beet, Kiev, reports that in 1953 var. P 028, resistant to cercosporosis [*Cercospora beticola*: **38**, 47], was put into production at the 'Pervomaĭskaya' Beet exp. Selection Sta., Krasnodar region. In var. tests in 1955 and 1956 in the Novo-Kuban and Korenovskaya breeding fields P 028 showed the highest resistance to *C. beticola*, with a yield of 363 centners/ha., sugar content 19·1%, and sugar yield 69 c./ha., the corresponding figures for the standard var. P 06 being 368 c., 17·5%, and 64·2% [? c./ha.].

Krexner (R.). **Der Rübenfeind Nr. 1 im Jahre 1959.** [Beet enemy No. 1 in the year 1959.]—*Pflanzenarzt*, **12**, 11, pp. 114–116, 2 fig., 1959.

In the wet year of 1959 beet losses due to *Peronospora schachtii* were exceptionally severe in Austria [cf. **34**, 15], crops adjacent to overwintered seed beet being particularly affected. The root crop should, where possible, be not less than 1 km. away, and up-wind. Prompt removal of infected plants from the seed crop and Cu spraying of both steckling and seed stands where the disease makes its appearance is recommended. The root crop should be sprayed if there is an early heavy attack. Tabulated results relating root and sugar yield losses and harmful N levels to the level of infection are in agreement with reports from other countries.

Pozhar (Z. A.). О борьбе с пероноспорозом. [On the control of *Peronospora schachtii*.]—*Sug. Ind., Moscow*, **34**, 1, pp. 57–59, 2 fig., 1960.

Reports of experiments from the All-Union Sugar Beet sci. Res. Inst. show that early infection by *P. schachtii* [cf. **37**, 332] is most harmful: in May it resulted in a 41% reduction of sugar yield, in June 38%, in July 33%, and in August 8%. Yield reduction in transplants infected at the rosette stage was 64·2% as against 37% with infection at stem or flowering. Agro-technical recommendations for control are made: seed should be treated with granosan or mecuran; spraying of beet and transplants with 1% Bordeaux mixture (2 repetitions) should give 3–4-fold reduction but large scale spraying at 15–20 day intervals is needed where infection is widespread.

Buxton (E. W.) & Perry (D. A.). **Pathogenic interactions between Fusarium oxysporum and Fusarium solani on Peas.**

Perry (D. A.). **Studies on the mechanism underlying the reduction of Pea wilt by Fusarium solani f. pisi.**—*Trans. Brit. mycol. Soc.*, **42**, 3, pp. 378–387, 1 fig., 2 graphs; pp. 388–396, 1 graph, 1959.

At Rothamsted exp. Sta. glasshouse inoculations of Onward peas confirmed earlier observations that severity of wilt caused by *F.o.* f. *pisi* [**39**, 66, 450] was decreased by simultaneous inoculation with *F.s.* f. *pisi* [**35**, 411]: the reduction was greater when the proportion of *F. solani* in the inoculum (a culture suspension, poured

over the roots) was increased. Inoculation with *F. solani* 2 or 4 days before *F. oxysporum* was more effective in reducing wilt than simultaneous infection. Results of tests with unsterilized and sterilized soil were similar, indicating that no other micro-organisms were involved. In the field *F. solani* entered the roots before *F. oxysporum*, but the plants were killed by the wilt pathogen. Spread of wilt along the rows was slower from foci of inocula containing both fungi than from *F. oxysporum* alone; the same was true of foot rot and *F. solani*. The only reliable taxonomic criteria for distinguishing the 2 fungi are differences in appearance of the macrospores.

Most of the results detailed in the 2nd paper have been noticed [**37**, 652].

Bywater (Joan) & Hickman (C. J.). **A new variety of Phytophthora erythroseptica, which causes a soft rot of Pea roots.**—*Trans. Brit. mycol. Soc.*, **42**, 4, pp. 513–524, 4 fig., 2 graphs, 1959.

The fungus isolated at the Dept Bot., Univ. Birmingham, from pea roots in the glasshouse and named *P.e.* var. *pisi* was almost certainly derived from field soil. Infected roots were soft, sodden, and faintly discoloured, and the shoots wilted when root infection was severe. Infection could be obtained either by planting Early Bird peas in soil inoculated with agar disks containing mycelium or by dipping washed roots in a suspension of zoospores, which encysted on the root tips, germinated, and penetrated the roots. Inter- and intracellular hyphae grew first along the stele and then into the cortex. Abundant sex organs usually formed in infected tissue and sporangia grew out of the roots. Infection was mild out of doors in the summer and very severe in the glasshouse at 15° C.

The features of the new var. are uneven tortuous hyphae, lack of aerial mycelium, thicker oogonial and oospore walls, temp. range approx. 12–30° C., and pathogenicity to pea.

Richardson (L. T.). **Effect of insecticide-fungicide combinations on emergence of Peas and growth of damping-off fungi.**—*Plant Dis. Reptr*, **44**, 2, pp. 104–108, 1 fig., 1 graph, 1960.

At Canada Dept Agric., London, Ont., seeds treated with aldrin, dieldrin, or lindane [cf. **36**, 540; **37**, 623; **39**, 305] and subsequently sown in sterile sand inoculated with *Pythium ultimum* or *Rhizoctonia* [*Corticium*] *solani* appeared more susceptible to pre-emergence damping-off than untreated seeds, though combinations with arasan SFX, orthocide 75W, or spergon SL ensured better protection than the fungicides alone. In soils free from the pathogens none of these dressings produced any effect on seedling emergence. Applied to cultures the insecticides, particularly lindane, retarded mycelial growth, and in combination with the fungicides increased the inhibitory effect of the latter.

Ewing (E. E.). **Factors for resistance to pre-emergence damping-off in Pea (Pisum sativum L.) incited by Pythium ultimum Trow.**—*Diss. Abstr.*, **20**, 5, p. 1518, 1959.

Several vars. of peas proved resistant to pre-emergence damping-off when sown in steamed soils inoculated with *P. ultimum* [cf. **38**, 723 and above] or in the field near Toluca, Mexico, where this fungus appeared to be responsible for the disease. Resistance was shown to be due to the presence in the testa of the basic gene *A* for anthocyanin. If seed coats were *a*, then the degree of susceptibility was greatly influenced by the status of the *R r* gene pair, wrinkled (*r*) seeds being much more susceptible than round (*R*) in the same pods. Yellow (*I*) seeds gave better stands than green (*i*) in the same pods. Resistance was intimately associated with the presence in the testa of tannin-like, colourless, phenolic compounds. There are indications that these compounds are leuco-anthocyanins, and that compounds of

delphinidin are involved. It appears unlikely that resistance can be separated from the undesirable darkening upon cooking and astringent taste of *A* seed coats.

Klement (Z.) & Lehoczky (J.). **A Borsó baktériumos zsírfoltossága Magyarországon.** [Bacterial blight of Peas in Hungary.] —*Növénytermelés*, **9**, 1, pp. 59–66, 3 fig., 1960. [Russ., Engl. summ.]

The causal agent of this disease, known in Hungary for some time, was identified at Res. Inst. for Plant Protection, Budapest, as *Pseudomonas pisi* [**11**, 222]. Studies of biochemical properties suggested that *P. pisi* might not represent a homogenous sp. *Sitona* spp. may play a part in its transmission.

Zaumeyer (W. J.) & Patino (G.). **Vein necrosis, another systemically infectious strain of Alfalfa mosaic virus in Bean.** —*Phytopathology*, **50**, 3, pp. 226–231, 11 fig., 1960. [16 ref.]

A more detailed account [**39**, 138] from Beltsville, Md, of a new lucerne mosaic virus str. All 26 bean (*Phaseolus vulgaris*) vars. inoculated proved susceptible but not to the same extent.

Tousson (T. A.), Nash (Shirley M.), & Snyder (W. C.). **The effect of nitrogen sources and glucose on the pathogenesis of Fusarium solani f. phaseoli.**—*Phytopathology*, **50**, 2, pp. 137–140, 3 fig., 1960.

A more detailed account from Univ. Calif., Berkeley, of infection of *Phaseolus vulgaris* [**39**, 257].

Uehara (K.). **On the phytoalexin production of the Soybean pod in reaction to Fusarium sp., the causal fungus of pod blight. II. On the effect of conditions of the spore suspension of the causal fungus upon phytoalexin production.**—*Ann. phytopath. Soc. Japan*, **24**, 4, pp. 224–228, 1959. [Jap. Abs. from Engl. summ.]

In further studies [**39**, 365] phytoalexin was copiously produced when a suspension containing 40 or more *F.* spores microscope field (at × 150) was placed on a soybean pod; a similar suspension of 3–6 spores, spore suspension heated at 100° C. for 10 min., or supernatant from a suspension of macerated spores failed to stimulate production. The supernatant of a spore suspension incubated for 24 hr. at 23° C. also induced production, but not after heating to 60° for 10 min.

Walker (J.). **Two seed-borne fungi of French Bean—Phaseolus vulgaris L.**—*J. Aust. Inst. agric. Sci.*, **26**, 1, pp. 60–63, 3 fig., 1960.

French beans in N.S.W. are commonly attacked by *Rhizoctonia* sp. [cf. **29**, 499] and *Sclerotinia sclerotiorum* [cf. **33**, 401]. Both have been found for the 1st time in N.S.W. to be carried by seed produced on the Far S. Coast. In samples of Brown Beauty and Hawkesbury Wonder *Rhizoctonia* infection was under 1%, while in 1 sample of the latter var. *S. sclerotiorum* infection was 1–3%. The degree of seed infection is probably related to the weather conditions during seed maturation.

Ujević (I.) & Staněk (M.). **Použití fytoncidů česneku k moření semen Fazole proti anthraknóze způsobené houbou Colletotrichum lindemuthianum (Sacc. et Magn.) Bri. et Cav. a proti skvrnitosti vyvolávané bakterií Xanthomonas phaseoli (E. F. Smith) Dowson.** [Use of the phytoncides of garlic for the treatment of Bean seeds against anthracnose caused by the fungus *C. lindemuthianum* and the spot caused by the bacterium *X. phaseoli*.]—*Ann. Acad. tchécosl. Agric.*, **33**, 2, pp. 237–252, 4 pl. (10 fig.), 1 fig., 1 diag., 3 graphs, 1960. [Russ., Germ., Engl. summ. 14 ref.]

In further studies [**38**, 50] at Res. Inst. of Plant Production, Ruzyně, Czecho-

slovakia, 48 hr. soaking of bean [*Phaseolus vulgaris*] seeds, var. Zlatý roh, in garlic mash (dilution 1:25) [cf. **39**, 11] gave 100% control of both pathogens. The treatment slightly inhibited emergence, but did not affect further growth. The yield of pods was over 3 times that of controls, the wt. of seeds 2·7 times, 90·7% of which were healthy compared with 16·4% in controls. It is recommended that treated seed should be sown in sufficiently moist soil and in a larger quantity than usual.

Ercolani (G. L.). **Una batteriosi del Fagiolo, nuova per l'Italia.** [A bacteriosis of Bean, new for Italy.]—*Ann. Sper. agr.*, N.S., **14**, 1, *Suppl.*, pp. xv–xxxiii, 7 fig., 1960. [Engl. summ. 76 ref.]

An account, based largely on the literature, of the symptoms, causal organism, and control of halo blight (*Pseudomonas medicaginis* f. sp. *phaseolicola*) [*P. phaseolicola*: map 85] 1st found in Italy in 1958 on Borlotto di Vigevano dwarf beans [*Phaseolus vulgaris*] growing under irrigation in the province of Bologna.

Calvert (O. H.), Williams (L. F.), & Whitehead (M. D.). **Frozen-lima-bean agar for culture and storage of Phytophthora sojae.**—*Phytopathology*, **50**, 2, pp. 136–137, 1960.

At Mo. agric. Exp. Sta., Columbia, this medium (18% frozen Lima beans, 2% agar), the preparation of which was described by Smoot *et al.* [**37**, 503], proved very satisfactory for providing inoculum of *P.* [*megasperma* var.] *sojae* [**38**, 642; **39**, 451]. Cultures were viable after 4 months at 8° C. Soybean seedlings were inoculated successfully by picking up a tuft of mycelium from a plate culture on the blunt side of a half-spear needle and inserting it directly into the epicotyl or hypocotyl. The method enabled a distinction to be made between lines uniformly resistant and those heterogeneous for resistance. Ralsoy, Arksoy, Mukden, and lines carrying the latter type of resistance were the only resistant ones; Dorman, CNS, P.I. 215693, D54-2437, and S5-7116, all previously reported to be resistant, were only slower in developing symptoms.

Sal'nikova (Mme A. F.). Методика анализа семян Сои на заболевания. [Methods for analysing Soy seeds for disease.] – Бюлл. н.-т. Информ. Дальневост. н.-и. Инст. Сел. Хоз. [*Bull. n.-t. Inform. Dal'nevost. n.-i. Inst. Sel. Khoz.*], *1958*, 6, pp. 11–12, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 20, p. 198, 1959.]

The methods used for detecting *Pseudomonas glycinea* [**37**, 626], *Xanthomonas phaseoli* var. *sojense*, *Ascochyta sojaecola* [**33**, 462], *Fusarium* spp., *F. scirpi*, and *Sclerotinia libertiana* [*S. sclerotiorum*] on soybean seeds are described. These appear to be the most dangerous infections in the [Soviet] Far East.

Kingsley (T.). **Downy mildew of Soya Bean.** –*Plant Path.*, **9**, 1, p. 38, 1960.

During the summer of 1959 Bansei soybean, grown from U.S.A. seed in Suffolk, was attacked by downy mildew (*Peronospora manshurica*) [cf. **38**, 445; map 268], a new record for England.

Brown (J. C.) & Tiffin (L. O.). **Iron chlorosis in Soybeans as related to the genotype of rootstock : 2. A relationship between susceptibility to chlorosis and capacity to absorb iron from iron chelate.** –*Soil Sci.*, **89**, 1, pp. 8–15, 1 diag., 4 graphs, 1960.

In further studies [**38**, 236] at the Mineral Nutrition Lab., Agric. Res. Serv., Beltsville, Md, soybean vars. P.I.-54619-5–1 and Hawkeye were grown in pre-nutrient cultures with varied Fe and P conc. Subsequent Fe 55, 59 absorption measurements were made, using an absorption nutrient containing radioactive Fe and, in 2 tests, varied concs. of Fe ethylenediamine di-*o*-hydroxyphenylacetic acid (EDDHA) and of the latter alone.

It is suggested on the basis of the results that susceptibility to chlorosis in plants may be related to the metabolic process involved in the separation of Fe from Fe EDDHA and that roots, P, and the chelating agent may all be competitors for Fe at the root.

De Berchoux (C.). **La rosette de l'Arachide en Haute-Volta.** [Groundnut rosette in the Upper Volta.] —*Oléagineux*, **15**, 4, pp. 229–233, 2 fig., 1 graph, 1960.

Where climatic factors favour the development locally of *Aphis leguminosae*, the vector of groundnut rosette virus [cf. **36**, 163], the disease is of the chlorotic type [**17**, 582] and appears to be due to a virus of the yellows, not the mosaic, type. The losses sustained by late, semi-erect vars. are often considerable, no crop being obtained if infection occurs within 40 days of sowing, though the yield is almost normal if it occurs more than 100 days after sowing.

At Niangoloka exp. Sta. in 1959 the yields of the resistant lines 48-36 and 48-37 from Bambey Res. Sta. were 1,785 and 1,830 kg. ha. (pods) in soil given NP manure, as against 1,334 kg. ha for 28-206. The figure for 1-040 was 2,011 kg. ha., and this line will be issued to native growers in 1960. Lines 1041 and 1042 were potentially good producers, but germination was poor; this feature can be eliminated by selection. The resistance character appears to be of genetic origin. The resistant vars. are not immune, but so far have given very promising results in large-scale cultivation.

Castellani (E.). **La ruggine dell' Arachide.** [Rust of Groundnut.] —*Oleagin.*, **13**, 11–12, pp. 261–270, 3 fig., 1 graph, 1959. [49 ref.]

After noting in detail the geographical distribution and economic importance of groundnut rust (*Puccinia arachidis*) [map 160], the author (Ist. Patol. veget., Turin) describes the symptoms of the disease and gives the results of his studies on the fungus in the Dominican Republic [**38**, 450].

Ter Horst (J. K.). **Olie helpt niet tegen de Cercosporabladvlekkenziekte van Pinda.** [Oil does not help against the *C.* leaf spot disease of Groundnut.] —*Surinaam. Landb.*, **7**, 4, pp. 115–117, 1959. [Engl. summ.]

Even frequent low-vol. applications of orchard spray oil at 2,887 l. ha. proved useless against *Mycosphaerella berkeleyi* and *M. arachidicola* on groundnuts at the Landbouw-proefstation, Paramaribo, in 1958–9.

Diener (U. L.). **The mycoflora of Peanuts in storage.** —*Phytopathology*, **50**, 3, pp. 220–223, 1960.

A more detailed account of moulds on groundnuts [**39**, 68].

Alicbusan (R. V.), Schafer (L. A.), & Revilla (B. A.). **Spore trapping experiments with Alternaria porri (Ellis) Cif. and Erysiphe polygoni DC.** —*Philipp. Agric.*, **43**, 4, pp. 310–313, 1 fig., 1959.

Glass slides smeared with petrolatum on 1 side and placed in an onion field trapped in 3 trials an av. of 29, 227, 117 spores of *A. porri* [map 350] in the periods 8.30–9 a.m., 1.30–2 and 4.30–5 p.m., respectively; the corresponding figures for *E. polygoni* in a pea field for 7.30–8.0 a.m., 1.30–2.0, and 6.0–6.30 p.m. were 107, 3,694, and 1,585. It is suggested that application of fungicides in the morning, when spray drift would be less in the stiller air, would help to prevent the big release of spores round about midday.

Van Doorn (A. M.). **Onderzoekingen over het optreden en de bestrijding van valse meeldauw (Peronospora destructor) bij Uien.** [Investigations of the occurrence and control of downy mildew (*P. destructor*) on Onions.] —*Tijdschr. PlZiekt.*, **65**,

6, pp. 193–255, 4 pl., 5 graphs, 2 maps, 1959. [Engl. summ. Published separately as *Meded. Inst. Plziektk. Onderz., Wageningen* 210.]

In this exhaustive account it is stated that the disease appears first in systemically infected plants growing from infected bulbs. An early and heavy attack on seed-sown onions may cause a yield reduction of 30%, because of poor bulb development. On replanting, however, only a few bulbs from diseased plants develop systemic infection. Spread is rapid, 1 day of suitable weather sufficing to produce a zone of infection, 1–2 m. diam., round a systemically infected plant. Starting from an infected seed crop, the disease is able to extend to 600 m. during the 1st period of spread, 1,000–1,600 m. in the 2nd and 3rd, and 2,000 m. in the 4th. All Dutch vars. are equally susceptible, but less so than the foreign vars, perhaps because their leaves have a more waxy surface.

For sporulation 100% R.H. appears to be necessary; it is highly stimulated by free water on the leaves. Light is apparently significant, sporulation occurring only in the evening and at night (8 p.m.–6 a.m.). Assuming the first spores appear 3–5 hr. after a favourable period, R.H. between 5 p.m. and 3 a.m. is of great importance for inducing sporulation. In spore germination tests the min. temp. was 1° C., opt. 10°, and max. about 28°. When R.H. falls below 100%, the germination percentage of attached spores decreases to about zero in 3–5 hr.

Control measures include restriction of N fertilizers to discourage lush growth, isolation of seed crops, and avoidance of cultivation alongside tall-growing crops or on low-lying soils. In fungicide trials [cf. **39**, 2] only zineb and maneb gave sufficient control: both had a double action, stimulating plant growth while killing the fungus. With sown onions the best results were obtained by low-vol. spraying with zineb (3 kg. 150–200 l. water ha.) every 7–10 days. For the seed crop 200 l. water should be used and a sticker included. Zineb is successful only as a protectant: an application after a critical day was at best only one half as effective as one made before. Maneb is not recommended because of its excessive growth-promoting effect.

Jacks (H.). **Seed disinfection. XVI. A note on the effects of fungicides on viability of Onion seed.**—*N.Z. J. agric. Res.*, **3**, 1, pp. 194–195, 1960.

Results are given of tests at Massey agric. Coll., Palmerston North, on the emergence of Pukekohe Longkeeper seed in perlite, in soil infested with *Pythium ultimum* [cf. **38**, 723], and also in the field, after treatment with 17 fungicides applied at 0·25% seed weight. Some treatments reduced while others increased the speed of emergence, orthocide and premasan being the most effective on the whole. Viability was reduced after 2 months in storage and lost entirely after 2 yr.

Kaul (T. N.). **Occurrence of Heterosporium blight of Onions in India.** *Curr. Sci.*, **29**, 1, pp. 31–32, 1 fig., 1960.

This disease (*Heterosporium allii-cepae*) [cf. **16**, 773], previously recorded in Norway, Serbia, France [**7**, 218], and Great Britain [**25**, 513], is reported from Lalmandi agric. Res. Sta., Srinagar, to attack onion leaves and seed stems at the Provincial agric. Res. Farm, Shalimar, a new record for India.

İren (S.). **Soğanlarda antraknoz—Colletotrichum circinans (Berk.) Vogl.** [Anthracnosis of Onions—*Colletotrichum circinans*.]—*Bitki Koruma Bülteni*, **1**, 1, pp. 15–16, 1 fig., 1959. [Engl. summ.]

C. circinans [cf. **35**, 264], the causal agent of onion smudge, is reported for the 1st time from Turkey, where it was noted on white onion in 1956 at Ankara. Damage is confined to the surface and damp weather favours development of the disease, which is of no great importance in Turkey.

Newhall (A. G.) & Brann (J. L.). **Onion smut control experiments with granule formulations in greenhouse and field.**—*Plant Dis. Reptr*, **44**, 4, pp. 269–272, 1960.

At Cornell Univ., Ithaca, N.Y., these trials showed that attaclay granules containing insecticide and carrying not more than 4% of a fungicide containing 50% active ingredient (thiram, captan, or phaltan), scattered at 25–30 lb./acre in the open furrow over the seed, reduced *Urocystis cepulae* [cf. **35**, 381] in a wet muckland soil from 51·6% smutted plants to 2·3–11·3%.

Venkatakrishniah (N. S.). **Smut on Onion and Garlic in Mysore.**—*Curr. Sci.*, **29**, 1, pp. 26–28, 5 fig., 1960.

Urocystis cepulae [map 12] was found in 1 field in the Kolar district, Mysore, in 1958 and 1959, a new record for India from Dept Agric., Bangalore.

Beraha (L.), Linn (M. B.), & Anderson (H. W.). **Development of the Asparagus rust pathogen in relation to temperature and moisture.**—*Plant Dis. Reptr*, **44**, 2, pp. 82–86, 1960.

At Univ. Ill. agric. Exp. Sta., Urbana, *in vitro* tests showed that the pycnia, aecia, and primary and secondary uredia of *Puccinia asparagi* [**38**, 644] developed most rapidly at 25°–30° C. In inoculated plants held at 10° for 16 days the appearance of the uredia was delayed by 10 days, but by only 5 days if the plants were held at 25° initially. A 3 hr. wetting at 15° was necessary for initial infection (intensity 0·7, rising to 1·3 at 23°); a 9 hr. wetting at 15° gave the max. intensity (5). Uredospores collected 5–7 days after sorus eruption germinated better at 10° than those collected earlier. Max. germination of mature uredospores was attained at 10–15° after 3–4 hr. incubation.

Lubani (K. R.). **Suscept-pathogen relationship between the Asparagus plant and the rust fungus, Puccinia asparagi.**—*Diss. Abstr.*, **20**, 5, p. 1556, 1959.

A description of the penetration and invasion of the host investigated at Univ. Ill. [cf. above].

Lehoczky (J.). **A Sárgarépa sztemfiliumos feketerothadásának hazai előfordulása.** [Incidence of the black rot of Carrot in Hungary.]—*Ann. Acad. Hort. Vitic.*, **20** (*1956*), pp. 3–36, 13 fig., 1 graph, 1957. [Russ., Engl. summ. (3 pp.). Received Jan. 1960.]

This report by the Inst. Phytopath., Budapest, notes the symptoms of the infection and describes its causal agent, *Stemphylium radicinum*, as known in Hungary, where it has probably been present for some time. The best protection of seed was obtained by mercurials [cf. **38**, 126], 0·2% higosan (methoxyethyl mercurous chloride) or germisan at 5 g./kg. seed and by 0·2% $AgNO_3$.

Thayer (P. L.). **Control of Celery early blight and bacterial blight in the Everglades with dyrene combinations.**—*Plant Dis. Reptr*, **44**, 3, pp. 167–169, 1960.

In the tests at the Everglades Exp. Sta., Belle Glade, Fla, dyrene at 1½ lb./100 gal., or at 1 lb.+tribasic $CuSO_4$ or +Cu Zn chromate at 2 lb. gave effective control of celery early blight (*Cercospora apii*) [**39**, 77], but when added to the Cu spray it had little influence in control of bacterial blight (*Pseudomonas apii*) [**37**, 701]. It caused no visible injury to plants in the seed-bed or field whether applied alone or with Cu and streptomycin [cf. **35**, 412].

Sehgal (S. P.) & Mathur (B. L.). **Cercospora leaf spot of Spinach.**—*Sci. & Cult.*, **25**, 1, p. 77, 1959.

The *C.* sp. causing leaf spot of spinach in the Jaipur and Kota districts was found

at the Plant Path. Section, Rajasthan Agric. Dept, to resemble closely *C. beticola* [cf. **35**, 737], apparently the 1st record of the fungus on spinach in India.

Murakishi (H. H.). **An apparently new root necrosis disease of Rhubarb.**—*Plant Dis. Reptr*, **44**, 3, pp. 186–188, 2 fig., 1960.

An unidentified, non-sporulating fungus was the cause of hard, easily separable necrotic streaks of the vascular tissues of the main and lateral roots and a yellowing of the margins of lower leaves of rhubarb. The infection was transmitted at Mich. State Univ., East Lansing, by dipping the seeds or the roots of the seedlings in homogenized mycelial suspensions before planting, by sowing healthy seeds in inoculated soil, or by sowing inoculated seed. In seedlings of the Victoria var. leaf symptoms appeared in 3 weeks and root symptoms in 3–6 weeks. Host range tests showed the specificity of the pathogen for rhubarb.

Boswell (V. R.), Doolittle (S. P.), Pultz (L. M.), Taylor (A. L.), & Campbell (R. E.). **Pepper production, disease and insect control.**—*Fmrs' Bull. U.S. Dep. Agric.* 2051 (Revised), 33 pp., 18 fig., 1959.

Some additional diseases [cf. **34**, 126] of peppers [*Capsicum* spp.] are given.

Simons (J. N.). **Effects of foliar sprays of cytovirin on susceptibility to and transmission of Potato virus Y in Pepper.**—*Phytopathology*, **50**, 2, pp. 109–111, 1960.

At Fla agric. Exp. Sta. a foliar spray of 7 p.p.m. cytovirin [**37**, 28; **38**, 278] applied to California Wonder pepper (*Capsicum annuum*) plants in the 6–8-leaf stage, 24 hr. before inoculation with potato virus Y [**39**, 453] reduced susceptibility. Severe phytotoxicity occurred, but recovery took place in 2–3 weeks; growing the plants in bright sunlight instead of 80% shade reduced the damage but lessened the inhibitory action of cytovirin. The protective effect was greater on plants inoculated by rubbing than by aphids (*Myzus persicae*). In systemically infected plants cytovirin reduced the virus titre as assayed by aphid transmission. Higher concs. (28 and 56 p.p.m.) of cytovirin were ineffective.

Taylor (J.) & Dobson (J. W.). **The relation of fertilization to development of bacterial spot on Pepper.**—*Plant Dis. Reptr*, **44**, 3, pp. 172–175, 2 fig., 1960.

Investigations by the Ga Mountain Exp. Sta., Blairsville, showed that the incidence of bacterial spot (*Xanthomonas vesicatoria*) [cf. **39**, 77] on pepper [*Capsicum annuum*] decreased to almost nil at the highest rate, as 4–12–12 fertilizer with NH_4NO_3 side-dressing was increased from 0 to 5,000 lb. acre. *Cercospora* [*capsici*] leaf spot, on the other hand, was not affected by fertilizers and induced large-scale defoliation in all the plots.

Van Koot (Y.) & Van Dorst (H. J. M.). **Virusziekten van de Komkomer in Nederland.** [Virus diseases of Cucumber in the Netherlands.] *Tijdschr. PlZiekt.*, **65**, 6, pp. 257–271, 4 pl. (2 col.), 1 graph, 1959. [Engl. summ.]

An authoritative account, from the Proefstation voor de Groenten- en Fruitteelt onder Glas, Naaldwijk. *Cucumis* virus 1 [cucumber mosaic virus: **38**, 495] occurs mainly in the autumn. It is transmitted by *Aphis gossypii* [cf. **38**, 236] both during the propagation period and during the remainder of the season. Damage is greatest, some plants wilting and dying, when the temp. during the incubation period is low.

Cucumis virus 2 [cucumber green mottle mosaic] is very frequent on cucumber under glass. Freshly harvested seed is an important source of infection: the percentage of infection falls fairly rapidly, but the seed may remain infectious for more than 6 months. *Cucurbita ficifolia*, widely used as a rootstock in the Netherlands, is a carrier of this virus, which is readily transmitted by grafting, pruning, and other cultural procedures, and perhaps capable of survival in the soil.

Cucumis virus 2 A [cucumber green mottle mosaic str.] is very rare. Its physical properties are the same as those of the foregoing, but the symptoms are more severe.

Cucumber necrosis virus, so named at the suggestion of D. H. M. Van Slogteren [cf. **39**, 454], is the most important of the cucumber viruses in the Netherlands. The authors at first thought that it was of the tobacco ringspot type [cf. **35**, 266] but it was subsequently found (Van Dorst, *Jversl. Proefst. Groenten- en Fruitteelt onder Glas*, pp. 124–128, 1956) to bear some resemblance also to tobacco necrosis virus. Perhaps both of these viruses are involved. The cucumber necrosis virus in Ontario [**38**, 386] has many of the characteristics of tobacco necrosis virus. The Netherlands virus is to a great extent inactivated by 80° C. for 10 min. Many host plants, including *Nicotiana glutinosa*, tobacco, and cowpea, develop small necrotic flecks on the inoculated leaves, and in a few, e.g. White Burley tobacco, systemic symptoms were seen for a short time. The virus persists for more than 6 months in the soil and plants can be infected from the soil. Infection is favoured by low soil and air temp., while warm sunny weather may permit complete recovery.

Nitzany (F. E.). **Natural hosts of Cucumber mosaic virus in Israel.** —*Plant Dis. Reptr*, **44**, 2, pp. 144–146, 1 fig., 1960.

At Beit Dagan-Rehovot agric. Res. Sta. cucumber mosaic virus was isolated from sugar and common beet [cf. **35**, 803], charlock (*Sinapis arvensis*), shell-flower (*Molucella laevis*), potato [**37**, 552], safflower, and Cavendish banana [cf. **28**, 227].

Chiu (W.-F.), Liang (S.-S.), & Hwang (C.-S.). **Field trials of controlling the Cucumber mildews.**—*Acta phytopath. sinica*, **5**, 2, pp. 123–131, 3 graphs, 1959. [Chin. Abs. from Engl. summ.]

In trials by Peking Univ. Agric. against downy mildew (*Pseudoperonospora cubensis*) [cf. **37**, 400] and powdery mildew (*Sphaerotheca humuli* var. *fuliginea*) [*S. fuliginea*] both Bordeaux mixture (1:1·5:200–300) and Cu stearate (1:4–6:800) proved effective, the latter more than the former against powdery mildew. Addition of 0·5% resin solution to Bordeaux rendered it more effective in a rainy season. A higher yield followed 1% $CuSO_4$ +5% soap solution (1:1) [cf. **39**, 87], which is easy to prepare. Dithane (1:800) [cf. **36**, 299] failed to control powdery mildew unless combined with 0·2% colloidal S; at 1:500 it was slightly phytotoxic to the Peking var. but gave 27% higher yield than the controls. Increase in yield in plots which had been given 2 Cu stearate sprays followed by 4 of Bordeaux was 38%, a gain of 77·3 yuen/mou; for 6 sprays with dithane the gain was only 22·3 yuen/mou, owing to powdery mildew.

Kochetova (Mme Z. N.). Белая гниль Огурцов. [White rot of Cucumbers.]—*Sad i Ogorod*, **97**, 12, pp. 25–27, 1959.

As the sclerotia produced on white rot of cucumber [? *Sclerotinia sclerotiorum*] are highly resistant to external influences, in situ disinfection of the soil is advocated when plants are at the vegetative stage and the sclerotia are forming mycelium or apothecia. In 1957 8 *in vivo* and *in vitro* tests on the vars. Dolzhik and Nerozimÿĭ (45 day seedlings) at the Byelorussian sci. Res. Inst. for Fruit, Vegetable, and Potato growing, using milled S+mercuran (dust at 100 g./seed frame), 0·5% Cu sulphur solution, and 0·005% K permanganate solution (600 g./seed frame), the last-named watered into the hole before planting was best, reducing infection by 24 and 19%. It also gave the best inhibition of sclerotial development.

Green (C. H.). **Effects of ploidy differences on horticultural characteristics and disease resistance in Watermelons.**—*Diss. Abstr.*, **20**, 5, p. 1519, 1959.

A method was developed and tested at Purdue Univ., Ind., for screening water-

melon seedlings in the greenhouse for resistance to *Fusarium* wilt [*F. oxysporium* f. *niveum*: **37**, 753; **39**, 367]. A comparison of tetraploid and triploid with resistant diploid Klondike R–7 showed no increase in wilt resistance in the polyploids.

Sitterly (W. R.). **A new insect vector of Squash mosaic virus.**—*Plant Dis. Reptr*, **44**, 2, pp. 134–135, 1960.

Experiments at S. Carol. agric. Exp. Sta., Clemson, demonstrated that the banded cucumber beetle (*Diabrotica balteata*) was able to transmit squash mosaic virus [cf. **38**, 52] for at least 4 consecutive days after 5 min. acquisition feeding without incubation in the vector.

Balul (Wanda). **Grzyby z rodzaju Fusarium znalezione na Dyni oleistej.** [Fungi of the genus *F.* found on oil Squash plants.]—*Acta agrobot.*, **8**, pp. 185–200, 12 fig., 1959. [Engl. summ.]

At the Plant Protection Inst., Reguły, Poland, 8 spp. and 3 vars. of *F.* which induce considerable losses in oil squash crops (*Cucurbita pepo* var. *syrica* and var. *oleifera*) were isolated from diseased seeds, seedlings, and fruits. They cause pre- and post-emergence damping-off, particularly detrimental to this crop.

Jackson (C. R.) & Weber (G. F.). **Morphology and taxonomy of Alternaria cucumerina.** *Mycologia*, **51**, 3, pp. 401–408, 2 fig., 1959. [13 ref.]

Further studies at Univ. Fla, Gainesville, on *A. cucumerina* [cf. **39**, 368] and *A. brassicae* f. *nigrescens* led the writers to agree with Nattrass [**11**, 696] that the two are synonymous. A description based on the authors' specimens is proposed as an emendation of those already in existence; it gives the conidial body as 33·6–129·4 × 13·4–33·6 μ, av. 56·6–86·5 × 18·1–20·8 μ, and the beaks 106–121 × 2·2–2·4 μ. This fungus was found to be the cause of all leaf spots of cucurbits examined in Florida.

Burkholder (W. H.). **Some observations on Erwinia tracheiphila, the causal agent of cucurbit wilt.**—*Phytopathology*, **50**, 2, pp. 179–180, 1960.

At Cornell Univ., Ithaca, N.Y., it was found possible to isolate this bacterium [cf. **38**, 176] either from the threads that appear when the 2 parts of a bisected infected stem are put together again and then gently pulled apart, or by inserting a needle in the vascular tissue at the cut end of an infected stem and streaking on agar. Cultures remain viable for 6 months or more on agar slants flooded with sterile milk and maintained at 12° C. The pathogen soon loses viability on agar at room temp., and undergoes morphological changes [**37**, 703]; viability is lost also in plant tissue when it dries. The pathogen can overwinter, however, in cucumber beetles [*Diabrotica melanocephala*: **27**, 109], where it appears to be more at home than in the plant.

Jennings (D. L.). **Observations on virus diseases of Cassava in resistant and susceptible varieties. I. Mosaic disease.**—*Emp. J. exp. Agric.*, **28**, 109, pp. 23–34, 3 graphs, 1960.

In further experiments [cf. **36**, 746] in Tanganyika with hybrids of cassava with *Manihot glaziovii*, *M. dichotoma*, *M. catingae*, and *M. melanobasis*, back-crossed to cassava, and some intervarietal crosses, moderately resistant vars. exposed to a large population of the vector [*Bemisia* spp.] in the field developed a high incidence of infection. Removal of terminal buds in Apr. and May, when mosaic frequently appears on moderately resistant vars., led to the immediate development of symptoms on the new growth from lateral dormant buds, apparently already infected. The occurrence of the virus in symptom-free cuttings of 46106/27, 4763/16, 4032, and 37244 E differed greatly according to locality and year and bore no relation to the percentage of symptom-bearing plants recorded in field trials. There may

be a better chance of detecting virus in the stems of symptom-free plants that lose their leaves and become dormant late in the season than in those early in this respect. The tendency in symptomless plants for the virus to be confined to basal cuttings suggests that it moves downwards when conditions favour the resistance mechanism of the host.

Prasad (N.) & Singh (R. D.). **Anthracnose disease of Dioscorea alata L. (Yam, Eng., Ratalu, Hind.).**—*Curr. Sci.*, **29**, 2, pp. 66–67, 2 fig., 1960.

Symptoms noted by Agric. Dept, Rajasthan, Udaipur, India, were brown pinhead spots; on the stems they spread and coalesced, forming glazed, black areas, while on the leaves they coalesced and induced withering. In rainy seasons light or dark brown acervuli on both organs were visible with the naked eye. The pathogen, which was found specific to *Dioscorea*, closely resembled *Gloeosporium pestis*, previously identified on the same host [**9**, 429], which has since been merged with *Colletotrichum gloeosporioides* [*Glomerella cingulata*: **37**, 25].

Gandy (Doreen G.). **'Watery stipe' of cultivated Mushrooms.**—*Nature, Lond.*, **185**, 4711, pp. 482–483, 1960.

Further investigations [**38**, 290] at the Glasshouse Crops Res. Inst., Rustington, Littlehampton, Sussex, indicated that among a variety of symptoms of this disorder, also known as brown disease or La France disease, degeneration of the mycelium is the only consistent one. When plated on agar, fragments of the defective mycelium, the cells of which are shorter than normal and slightly swollen, produce weak, buff-coloured, adpressed colonies without rhizomorphs, while colonies from healthy mycelia are white, fluffy, rapidly growing, with rhizomorphs radiating from the point of inoculation. Studies in transmission of watery stipe, following Lindberg's method [**38**, 404], demonstrated weaker growth of the healthy mycelium on contacting the stunted one, and though no change of its older parts was apparent, it developed abnormally when subcultured. Healthy mycelium also grew at half the rate of the normal when immersed in a suspension with fragments of the affected macerated mycelium, from which the infective agent could be removed by filtering off the fragments.

Majerník (O.). **Príspevok k prognóze peronospóry Viniča.** [On prognosis of peronosporosis of Vine.]—*Biológia, Bratislava*, **13**, 8, pp. 575–590, 1958. [Russ., Germ. summ. Abs. in *Referat. Zh. Biol., 1960*, 3, p. 187, 1960.]

In studies at Dept Plant Biol., Biol. Inst., Slovak Acad. Sci., Bratislava, the following conclusions were reached: for short-term forecasting of peronosporosis [*Plasmopara viticola*: **39**, 70] av. temp. over the preceding 8 days and rainfall during the preceding 2 weeks provide the basic data. Cloud and wind currents should also be borne in mind. Rainfall–temp. graphs are used to determine spraying periods. A line through 10° [C.], parallel to the abscissa, indicates the possible threshold of infection, and 2 similar lines through 15 and 25° limit a zone (single hatched) of most frequent infection. The line through 20° indicates opt. infection. Perpendiculars at 60 and 80 mm. rainfall outline favourable conditions for the development of the disease (cross-hatched). On the day of the 1st appearance of secondary infection, intersections are marked on the graph from the av. temp. over the preceding 8 days and the total precipitation during the preceding 15 days. If the intersection point is situated in a zone with a single hatching, preparations should be made for spraying, if in a zone with cross hatching spraying must be done at once. The next application is made 8 days later or at the end of the 2nd incubation period if weather conditions do not change. If temp. and precipitation lines for any day intersect at a point in the cross-hatched zone, spraying should be carried out without waiting for the end of the period.

Koroткova (Mme P. I.). К вопросу применения искореняющих опрыскиваний в борьбе с мильдью Винограда. [Concerning the use of eradicant sprays in the control of Vine mildew.]—Бюлл. н.-т. Информ. н.-и. Инст. Виноград. Винодел. [*Bull. n.-t. Inform. n.-i. Inst. Vinograd. Vinodel.*], *1958*, 6, pp. 29–31, 1958. [Abs. in *Referat. Zh. Biol., 1960*, 3, p. 187, 1960.]

The action of various fungicides on the development of oospores of vine mildew [*Plasmopara viticola*: **39**, 150] in fallen leaves was studied at the Novocherkasskiĭ sci. Res. Inst. for Viticulture and Wine-Making, also the effect of autumn and spring spraying of stocks and soil on the appearance of the initial foci of infection. In spring oospores in untreated leaves kept in damp sand germinated on the 3rd day after the leaves were put in water. Oospores from leaves treated with Cu naphthenate in the autumn, kept under similar conditions, formed sporangia in 3 weeks, while oospores treated with the compound in spring did not develop. In field plots soil and vine stocks sprayed in autumn with 1% Cu naphthenate in Diesel oil emulsion, at 1,600 l. ha., developed initial foci equal in no. to the unsprayed; with both autumn and spring spraying and with spring spraying alone, initial infection was twofold less than in the untreated, though this initial infection made summer treatment essential. Preparation No. 47 and dinitrorhodanebenzene [**38**, 378], highly toxic to oospores in the lab., failed to give good results as eradicant sprays at 3,000 l./ha. The variability of the time factor in oospore germination, which lasts, according to the author, for more than a month, a dry period after spraying, and soil porosity also lessen the effectiveness of eradicant spraying.

Mayagoitia (H.), Uzcanga (C.), & Uzcanga (A.). **Clorosis en los viñedos de la Comarca Lagunera.** [Chlorosis in the vineyards of the Comarca Lagunera.]—*Ciencia, Mex.*, **19**, 1–3, pp. 32–36, 1959.

The disorder is attributed on the basis of studies at the Escuela Nacional di Ciencias Biológicas, I.P.N., Mexico, D.F., to a deficiency of soluble Fe in the plant tissues and probably in the sap caused by the alkaline reaction and high $CaCO_3$ content of the soil. Annual applications a fortnight before flowering of an Fe chelate spray (2 g./l.) are recommended.

Gärtel (W.). **Beitrag zur Kenntnis des Magnesiummangels bei Reben.** [Contribution to the knowledge of Mg deficiency in Vines.]—*Landw. Forsch., Suppl.* 13, pp. 45–58, 12 fig., 4 graphs, 1959. [33 ref.]

This is a tabulated report from the Institut für Rebenkrankeiten, Bernkastel-Kues Mosel. The deficiency is stated to be the most prevalent nutritional disorder of the vine in Germany. There are 2 forms, variously patterned necroses on young foliage, probably corresponding to the meristematic zones of the leaf blade, and wedge-shaped chlorotic areas on older leaves. Combined with P deficiency it is responsible for severe growth disturbances, known as 'acid injury', of which the principal foliar symptoms are chlorotic margins with brown dots and pronounced necroses, and irregularly bordered, brown, interveinal stripes. The results of analytical determinations of the Mg, P, and chlorophyll contents of affected leaves are presented.

Stations fédérales d'essais agricoles, Lausanne. Rapport d'activité 1958. [The Federal Agricultural Experiment Stations, Lausanne. Report of work in 1958.]—*Annu. agric. Suisse*, (**73**, éd. fr. **60**), N.S. **8**, 6, pp. 439–575, 9 fig., 9 diag., 6 graphs, 1959.

In the plant pathology section (pp. 521–541) [cf. **38**, 379] it is stated that the most serious and widespread disease of cereals was again yellow rust (*Puccinia glumarum* [*P. striiformis*]). All autumn vars. of wheat were infected, Probus being the most

susceptible; only a few active pustules were found on Cappelle. On spring wheat on the Plaine de l'Orbe there were heavy, late attacks by *P. graminis*.

On potato *Rhizoctonia* [*Corticium*] *solani* was particularly severe, favoured by dry conditions in Mar. and Apr. and the exceptionally warm weather in early May.

Black leg of young beet plants was due mainly to *Phoma* [*Pleospora*] *betae* and *Pythium* sp. Several cases of lucerne wilt (*Verticillium alboatrum*) were reported, and towards the end of the season *Pseudoplea trifolii* was sometimes observed on the stems and leaflets. The rapid spread of *Uncinula necator* on vine in damp weather in July and Aug. (temp. 20-22° C.) was important enough to justify a radio-warning to growers on 25 July. *Podosphaera leucotricha*, favoured by these same conditions, reached a disquieting level in all apple orchards, and perithecia were abundant in Valais and in the Léman Basin.

Fensulfan (A 512), at 0·2%, is recommended for the control of *Coniella diplodiella*: in a comparative trial at Pully on Chasselas vines given a 1st treatment on 20 Aug., 20 hr. after a hailstorm, and a 2nd on 1 Sept., following hail during the previous afternoon, and examined for infection on 16 Sept., this product was estimated to have a protective efficiency of 97·7%, compared with 76·8% for mesulphan at 0·35%, and 93·5% for orthocide at 0·5% [cf. **36**, 303]. The effect of the treatments was quite clear, though the level of attack was low.

In certain areas producing seed potatoes, early flights of *Myzus persicae*, vector of potato leaf roll virus and potato virus Y, invade the young plants before they have been rogued to eliminate tuber infections. In a trial to estimate the importance of this, ekatine was applied at 2 l./ha. as soon as the 1st aphids were seen on the plants, and half of this area was given a second treatment at 1 l. ha. 15 days later. The haulms of some plants were destroyed on date A (as specified for tubers to be admitted to class A), some tubers harvested 1 week later, and the rest at maturity. In 1958 the level of leaf roll (mature tubers affected) was 25·4% for the untreated, 9·8% for one insecticidal treatment, and 2·9% for two. The treatment had no effect on the frequency of virus Y.

Tobacco growers in the Tessin area, who have been planting SOTA White Burley hybrids resistant to veinal necrosis (str. of potato virus Y) [cf. **39**, 242], reported a new str., attacking not only these hybrids but also Mount-Calme Brun grown in the Vallée de la Broye. This str., while of restricted distribution in 1958, was considered to represent a considerable menace. Its range includes Samsun, Maryland, and Nijkerk, susceptible to the old str., and also Jaune R, Paesana, Paraguay, and Alsace. Symptoms on White Burley resemble those of the earlier str.: on solanaceous plants other than tobacco they are more clearly marked. A survey of diseased tobacco plants in the Tessin area and in the Vallée de la Broye revealed the following viruses: tobacco mosaic, scattered in all plantings except those of White Burley; cucumber mosaic, of low virulence, but certainly of economic importance because the infection is so common (nearly 100% in some fields); non-necrotic strs. of potato virus Y, not widespread and seldom noticed except when they occur in combination with cucumber mosaic, which leads to a serious mosaic with deformation; and lucerne mosaic virus, fairly frequent and occasionally causing leaf necrosis.

First results of a trial initiated in 1954 to compare the susceptibility of pear vars. to stony pit virus [cf. **37**, 487] indicate that Packham's Triumph and Buerré d'Anjou are very susceptible, Beurré Diel and Joséphine de Malines moderately susceptible, and Conference, Beurré Hardy, Précoce de Trévoux, and Williams Bon Chrétien resistant or only slightly affected.

Gambogi (P.) & Treggi (G.). **Brevi note di casistica fitopatologica.** [Brief notes on phytopathological records.]—Reprinted from *Agricoltura ital.*, N. 12, pp. 359-372, 6 fig., 1959.

Notes are given on some plant diseases studied in 1959 at the Osservatorio per le

Malattie delle Piante, Pisa, Italy [cf. **36**, 112]. Infection of peach by *Fusicoccum amygdali* [**39**, 424] was present everywhere in the vicinity of Lucca, *Cytospora* [*Valsa*] *leucostoma* occurring frequently also on the affected parts. Olive trees in the Province of Lucca developed symptoms of B deficiency [**36**, 707], which disappeared after an application of fitobor at 50–100 g./plant. Symptoms on beans [*Phaseolus vulgaris*] in the experimental field of the Istituto di Patologia Vegetale closely resembled those of bean yellow mosaic virus. Asparagus in the Province of Pisa was severely attacked by *Puccinia asparagi* [**36**, 681].

Jaarboek 1958. [Yearbook for 1958.]—*Versl. PlZiekt. Dienst Wageningen* 133, 152 pp., 30 fig., 1959.

In the section on pests and diseases (pp. 17–71) it is stated that combinations of Cu oxychloride or oxycarbonate with zineb have been approved for the control of *Phytophthora infestans* on potato [**38**, 222]. A number of beet crops in the north were heavily attacked by *Peronospora schachtii*, the seed crop being the principal source of infection. A bacterial wilt (*Pseudomonas* sp.) of oat plants occurred in several localities, particularly in the Wieringermeer district. Mildew (*Erysiphe graminis*) was severe on a number of cereals following damp weather in July–Aug. *Botrytis cinerea* caused heavy losses of seedling flax on reclaimed clay soils [**38**, 408]. *Peziculu corticola* is reported as an agent of cankers, particularly at the base of side branches, leading to wilting and top die back of pear trees. With a view to obtaining data on the level of virus infection in pear and apple trees and on the rate of spread of these infections annual inspections were carried out in 1957 and 1958 in some suitable orchards. In summer 1958 apple canker (*Nectria galligena*) caused rapid death of a number of trees, particularly on poorly drained, sandy soils.

In the section for special contributions (pp. 130–139, Engl. summs.) G. H. Boerema states that since 1956 *Uromyces croci*, known formerly only on the leaves (cf. Moore [**19**, 153]), has been regularly found on the underground parts of various *Crocus* spp. Local infections, usually of mother corms, originating from teleutospores in the soil, produce lesions on the scales, which are particularly striking when the corms are lifted early but not so obvious later when the scales have turned brown. These lesions can penetrate deep into the flesh, and teleutosori may be produced at their centres, within the corm. Another type of attack, causing typical basal injury, occurs when mycelium grows directly from the mother corm into the developing corms, giving rise to systemic infection. The invading mycelium tends to follow the vascular bundles. The outer scales are unaffected, but infection penetrates deep into the corms, and the tissues are often darkened by the production of numerous teleutosori. Local infections can be controlled by treating the corms with an organic mercurial before planting; hot water treatment might be effective against systemic infection but no exact data are available. Infections of the aerial parts have not yet been seen in the Netherlands.

In 2 important areas of garden pea production *Mycosphaerella pinodes* [**28**, 433; **34**, 271] was found to be the agent of a new leaf spot disease of Allington Pippin and Winston apples. A conidial suspension from the str. on Allington Pippin produced spots on apple seedlings. Inoculation of apple leaves with strs. from peas did not produce symptoms, but the apple str. was particularly aggressive on pea.

A serious infection of the leaves of honesty (*Lunaria annua*) was caused by *Alternaria brassicae* [cf. **31**, 239], referred to as *Macrosporium lunariae* in the older literature. A serious leaf infection of marjoram (*Origanum majorana*), identical with that reported in Germany [**35**, 488], was caused by *A. porri*. Rust on the bulb scales of *Scilla bifolia* [cf. **39**, 415] was probably caused by *Uromyces scillae* [*U. scillarum*].

JOHANSSON (D.). **Växtsjukdomar och skadedjur i Skåne-Halland våren och sommaren 1959.** [Plant diseases and pests in Scania-Halland in the spring and summer of 1959.]—*Växtskyddsnotiser, Stockh.*, **23**, 6, pp. 86–90, 3 fig., 1959.

Physiological disorders noted [cf. **38**, 654] included Mn deficiency of oats and beet. In general, fungal pathogens were of little importance owing to the prevailing hot and dry weather, which made the persistence of *Fusarium* [*Calonectria nivalis*] on wheat throughout the summer all the more remarkable.

The heavy and widespread damage associated with *Didymella applanata* on raspberries may have been partly attributable to infection following oviposition by *Thomasiniana theobaldi* [cf. **39**, p. 426].

Taphrina aurea was very common on both wild and cultivated poplars (*Populus nigra*).

Abstracts of papers concerning horticulture, plant pathology and pest investigations at the Annual Meeting of the Agricultural Research Centre in 1959.—*Maataloust. Aikakausk.*, **31**, pp. 226–231, 1959.

Further studies by J. E. HÅRDH (Dept of Hort., Piikkiö, Finland) on blossom-end rot of Immuna tomato [**37**, 681] disclosed a marked increase (from 2·8 to 20·7%) in the number of damaged fruits during a 3-day period of physiological drought, while internal necrosis developed after 1 day, fruit sap conductivity remaining at a normal level. It is postulated, therefore, that the symptoms may arise from changes in enzymatic activity stimulated primarily by difficulties in water uptake.

In tests on the control of club root (*Plasmodiophora brassicae*) by ANNIKI LINNASALMI (Dept Plant Path., Tikkurila) using var. Ditmarsk cabbage, C.R.C. (4% Hg_2Cl_2 and 0·25% lindane) was either mixed into the pricking-out soil 3 and 5 g. seedling or used as suspension with or without clay for dipping the roots. The standard procedure is to mix 5 g. of the chemical into each transplanting hole, which is impracticable for large-scale use. All the treatments gave good control. The standard method produced the highest yields, av. weight of heads 1·67 kg. as against a max. of 1·44 for C.R.C. alone and 1·31 for the Hg_2Cl_2 and clay suspension dip. Used alone, Hg_2Cl_2 caused severe stunting, reducing the av. head weight to 0·95 kg. (untreated 0·48) [cf. **38**, 636].

The results of studies by EEVA TAPIO at the same institution on chlorosis in *Saintpaulia* [cf. **35**, 770] indicated that the disorder is of physiological origin, being caused by abrupt temp. changes, bright sunlight, or wetting the plants, especially the leaves, with cold water (1–5° C.).

Report of the Minister of Agriculture for Canada for the year ended March 31, 1959.—158 pp., 1959. 50 cents.

In the Plant Science section (pp. 17–45) of this report [cf. **38**, 385, 717] it is noted under Forestry Investigations that after each period of cloudy, humid weather followed by a continuous sunny period major symptoms of pine needle blight [*Lophodermium pinastri*: **37**, 115] were observed in Ont. Attack in early summer affected little of the needle length, but much more of it later when they were almost fully grown. The causal fungus of pine canker (*Atropellis* [*piniphila*: **38**, 344]), the incidence of which is high in Alta, with resulting deformation of stems of lodgepole pines 20 or more yr. old, does not affect jack pine [*Pinus banksiana*].

During 1958 Dutch elm disease [*Ceratocystis ulmi*: map 36; cf. **38**, 229] was found for the first time in 3 more counties of Ont.

Growing yellow and white birch seedlings in soil at 100° F. for 2 months produced no ill effects [cf. **38**, 385]: opt. temp. for the 2 spp. was about 85°. The implication of climatic conditions in birch dieback is being investigated [cf. **38**, 340].

Under Field Crops it is noted that the increase in severity of common root rots [unspecified] of wheat from E. to W. was correlated with the depth of seeding:

deep sowing should be avoided. *Agropyron* streak mosaic virus was common on couch grass [*A. repens*] in southern Ont. in 1958 [**37**, 516]: in a field experiment the virus caused 75% reduction in grain yields of Acadia spring wheat and 25% in Selkirk. Scald [*Rhynchosporium secalis*: **39**, 300], one of the most serious fungus diseases of barley in central Alta, reduced barley yields by 11 and 14% during controlled tests. Race 6A of oat stem rust [*Puccinia graminis*], one of the 3 from Ont. and Quebec [cf. **39**, 302], was first discovered in 1958.

In Fredericton the decapitation of and regular removal of axillary buds from potato plants resistant to late blight [*Phytophthora infestans*] resulted in the formation of giant leaves which were susceptible to races from which the plants are normally immune. Repeated alternate passage through these and the susceptible plants resulted in a race capable of attacking immune plants. Potato wart [*Synchytrium endobioticum*] was almost completely controlled in heavily infested soils and yields increased by mylone at 400 lb. acre. Wilting of potato plants from tubers of plants upon which Colorado beetles [*Leptinotarsa decemlineata*] had fed demonstrated that these insects could carry sufficient ring rot bacteria [*Corynebacterium sepedonicum*: **39,** 494] to infect a healthy crop.

In the Vegetable and Root Crops section the discovery is reported of 2 soil-borne and root-invading viruses (probably of the tobacco necrosis group) of glasshouse cucumbers [cf. **39**, 454] in S.W. Ont.

Under Fruit Crops mention is made of apple powdery mildew [*Podosphaera leucotricha*: **37**, 206] which was reduced by adding 6 lb. S to the regular organic fungicide spray. A schedule of organic mercury fungicides before bloom and captan in the cover sprays is recommended against apple storage rots (*Gloeosporium* and others [unspecified]). At least 2 latent viruses besides apple rubbery wood [map 305] and apple stem pitting [**39**, 178] are present in some apple clones in B.C. Wild western chokecherry bushes [*Prunus demissa*] growing near affected orchards in the interior have been shown to carry cherry twisted leaf [cf. **36**, 333] and apricot ring pox viruses. Virus-free nursery stocks of stone fruits, isolated from diseased trees, have remained virus free or nearly so for some years.

Strawberry mottle virus was eliminated in plants grown at 100° F. for 2 weeks, while several weeks' treatment removed strawberry latent virus str. A from small axillary crowns. Of 11 aphid spp. tested all failed to transmit strawberry crown proliferation, strawberry crinkle, and strawberry latent str. A viruses. Strawberry mild yellow edge virus was transmitted by the rose aphid [*Macrosiphum rosae*], mild mottle by 2 other aphid spp., and severe mottle by 1 of these 2 only. Strawberry veinbanding virus was transmitted by 9 of 11 spp.

In the Soil Sci. sect. (Microbiol.) (pp. 45–47), it is stated that the proportion of organisms which require one or more growth factors [**38**, 311] diminishes as the root surface of wheat plants is approached, while the number of bacteria capable of synthesizing any of the factors increases. In all, 9 factors are needed, singly or in combination, thiamine and biotin being most important. The substances promoting microbial growth at or near the root surface are apparently produced by the microbes and not excreted by the roots. Most bacteria were found on root surfaces (of wheat, oats, rye, and barley) irrespective of the type of plant, and this rhizoplane flora was more physiologically active than that of the rhizosphere or the soil apart from the root, from which it differed also in nutritional requirements. It was demonstrated that the plant root selectively stimulated certain types of bacteria, but was a less favourable environment for others.

Annual Report of the Ministry of Agriculture and Lands, Jamaica, for the year ended 31st December, 1957.—81 pp., 1959. 4*s*.

Some of the information in the report of the Plant Protection Div. (pp. 37–40) [cf. **38**, 271] has been noticed. The 'unknown disease' or lethal yellowing of coconuts

has continued to destroy the few remaining groves along the coast in the W. and incidence was high in the Negril area. Cultural treatment and N and K fertilizers had no apparent effect on 'frond drop' disease. Manzate at 2 lb. 100 gal. gave the best results against potato late blight [*Phytophthora infestans*], especially when applied by a low vol. mist blower, but was rather expensive. Cupravit also gave good control and was cheaper than Bordeaux, which was only moderately effective.

JOHNSTON (A.). **A preliminary plant disease survey in the British Solomon Islands Protectorate.**— 36 pp., Rome, Food and Agriculture Organization of the United Nations, 1960. [Mimeographed.]

Made in response to the recommendation of the Plant Protection Committee for the S.E. Asia and Pacific Region, this is based on a survey in May June 1959. It includes a list of diseases under hosts in alphabetical order of common names (botanical names are in an appendix), giving their distribution and a brief description where necessary. A final section contains conclusions and recommendations. Brown spot (*Cochliobolus miyabeanus*) was the only major disease of rice found. Leaf blight (*Phytophthora colocasiae*) causes considerable loss of taro (*Colocasia esculenta*), while a leaf and stem distortion of sweet potato, probably a virosis, is considered potentially serious. The danger to the scattered banana plants from *Mycosphaerella musicola* is at present negligible and banana bunchy top virus and Panama disease (*Fusarium oxysporum* f. *cubense*) are apparently absent. The list includes, *inter alia*, *Cordana musae* [map 168] and *Deightoniella torulosa* [175] on banana, *Corticium salmonicolor* [122] on cacao, *Mycosphaerella berkeleyii* [152] on groundnut, *Elsinoe fawcettii* [194] on lemon, *Puccinia polysora* [cf. below] and *Cochliobolus heterostrophus* [346] on maize, *Cercospora sorghi* [338] on sorghum, *Helminthosporium sacchari* [349], *Cercospora koepkei* [341], *Leptosphaeria sacchari* [330] and *Glomerella tucumanensis* [186] on sugarcane, and *Cercospora nicotianae* [172] on tobacco. In general the disease situation was favourable, isolated cultivations preventing the development of epiphytotics.

Outbreaks and new records.—*F.A.O. Pl. Prot. Bull.*, **7**, 11, pp. 147–148, 1959.

A. CICCARONE, Ist. Pat. veg., Univ. degli Studi, Bari, reports that angular leaf spot of cotton (*Xanthomonas malvacearum*) [map 57] is widespread on the Adriatic coast of Apulia, where cotton is grown from Foggia to the Gargano mountains.

A. JOHNSTON, F.A.O. Regional Office for Asia and the Far East, Bangkok, detected *Puccinia polysora* [map 237] on maize in several localities in the British Solomon Islands Protectorate in 1959; the rust appears to have been present for some time. It was also found in 1959 in Netherlands New Guinea, at Kota Nica agric. Exp. Sta., near Hollandia; in 1955 in Papua and in 1957 in New Caledonia. It is evident that the fungus has spread in Asia and Africa simultaneously.

JOHNSTON (A.). **Plant disease investigation in the Federation of Malaya.** *F.A.O. Pl. Prot. Bull.*, **8**, 1, pp. 1–4, 1959.

Much of this information has been noticed [cf. **38**, 595, 658, 761]. The cause of a dieback affecting cacao of all ages, severe in Trengganu but found also elsewhere, is as yet unknown. Distorted leaves with necrotic margins are shed from 1 or more branches, followed by those that replace them, until the bare twig dies back. No pathogen has been consistently isolated; though a virus cause is possible it seems more likely that environmental conditions, possibly a Ca deficiency, are responsible.

Foot rot and brown rot gummosis (*Phytophthora* sp., probably *P. parasitica*), bring about heavy losses in mandarin orange orchards, particularly in low-lying, coastal areas. In some parts of S. Perak large orchards have been almost completely destroyed and deaths have been heavy in Malacca also. Bacterial wilt (*Pseudo-*

monas solanacearum) [cf. **36**, 457] of tomatoes and potatoes is of minor importance at altitudes of 4,000–5,000 ft., where blight (*Phytophthora infestans*) [cf. **37**, 8] is more important on both crops. The Dutch potato vars. Voran and Gloria were resistant locally. Zineb gave encouraging results against this disease on tomato.

Jaarverslag 1958. [Annual report 1958.]—*Meded. LandbProefst. Suriname* 21, 88 pp., 1959.

This report [cf. **32**, 68], edited by J. H. Van Emden, contains a number of scattered references to subjects of phytopathological interest besides those contained in the section on plant diseases (pp. 70–75). They include some already noticed and the following. The results of tests in Venezuela (pp. 30–31) on 81 samples of Surinam rice indicated that a reasonable degree of field resistance to 'hoja blanca' [**39**, 169] may be expected from vars. Tijua and Holland 5023, while the material does not appear in general to belong to the highly susceptible group. Studies are to be undertaken in Surinam with reputedly resistant vars. from Cuba (Zayas Bazan, Paquita, and Cuba 65) and Venezuela (Sigadis). Symptoms highly suggestive of 'hoja blanca' were noticed in Surinam in 1958.

Diplodia natalensis was the principal cause of decay of oranges exported to Europe. Excellent control is afforded by dowicide A, the residue of which (250 mg. fruit) detected on official inspection at Rotterdam being regarded as completely innocuous to health.

Banana leaf spot [*Mycosphaerella musicola*] (p. 49) was effectively combated by mist applications of oil with a knapsack motor sprayer. A drawback to this method, however, is the difficulty of reaching the younger leaves and the risk of overdosage of the older ones. One case of infection by *Marasmius semiustus* [*M. stenophyllus*: **33**, p. 604] was observed. Fruit bodies developed during the wet season from the rotted areas with white mycelium on the pseudo-stem (p. 74).

Cacao (pp. 52–53) sustained heavy damage from *Phytophthora* [*palmivora*] during the rains and the results of spraying tests with oleocuivre did not give encouraging control. A disorder characterized by the formation of fruit cushions on the stem, abnormally profuse flowering, and poor fruit set, was considered by Dr. L. Hutchins to be identical with the 'cushion gall' reported from Costa Rica and Nicaragua [cf. **39**, 222].

Symptoms closely reminiscent of bronze leaf wilt [cf. **35**, 181] developed in a dwarf coconut plantation (p. 74).

Fruit bodies of the mycorrhiza on *Pinus caribbea* were identified at Univ. Leiden as those of *Pisolithus tinctorius* Pers. (p. 74).

Smith (G.). **An introduction to industrial mycology. Fifth edition.** xvi + 399 pp., 168 fig., London, Edward Arnold (Publishers) Ltd., 1960. 40*s*.

This edition [cf. **33**, 617] of this well known manual takes into account relevant new literature on systematic mycology and includes descriptions and illustrations of a few genera and spp. of moulds which were not included previously, but which, for various reasons, have become important.

Horsfall (J. G.) & Dimond (A. E.) (Editors). **Plant pathology, an advanced treatise. Vol. II. The pathogen.**—xiv + 715 pp., numerous fig., 16 graphs, New York and London, Academic Press, 1960. $22.

In this volume [cf. **39**, 269] an introductory section by the editors, on the concept of causality, is followed by contributions from G. L. McNew, 'The nature, origin, and evolution of parasitism'; F. C. Bawden, 'The multiplication of viruses'; Lilian E. Hawker, 'Reproduction of bacteria, actinomycetes, and fungi'; V. W. Cochrane, 'Spore germination'; S. Dickinson, 'The mechanical ability to breach the host barriers'; R. K. S. Wood, 'Chemical ability to breach the host barriers';

T. S. Sadasivan & C. V. Subramanian, 'Interaction of pathogen, soil, other micro-organisms in the soil, and host'; R. A. Ludwig, 'Toxins'; E. W. Buxton, 'Heterokaryosis, saltation, and adaptation'; T. Johnson, 'Genetics of pathogenicity'; R. E. F. Matthews, 'Virus inactivation *in vitro* and *in vivo*'; H. D. Sisler & C. E. Fox, 'Physiology of fungitoxicity'; S. Rich, 'Fungicidal chemistry'; and M. W. Allen, 'Nematocides'. The comprehensive presentation is similar to that of the previous volume.

Holton (C. S.), Fischer (G. W.), Fulton (R. W.), Hart (Helen), & McCallan (S. E. A.) (Editors). **Plant Pathology, problems and progress.**—xix—588 pp., 25 pl. (1 col.), 5 fig., 4 diag., 22 graphs, Madison, University of Wisconsin Press, 1959. $8.50.

This Golden Jubilee Volume of the American Phytopathological Society [cf. **37**, 642] comprises more than 60 papers (by 75 contributors) read by invitation at the Golden Anniversary Meeting of the Society held at Bloomington, Ind., 24–28 Aug., 1958.

The volume is divided into 10 parts. The 1st, devoted to the major addresses on historical and developmental aspects of plant pathology and, in addition, to papers on the history of plant pathology in N. America and the first 50 years of the American Phytopathological Society, includes reviews on the control of plant diseases by plant breeding, chemicals, and international collaboration. Each of the remaining parts is devoted to 1 of the 9 symposia (each of 3–7 papers) on the following topics: the physiology of parasitism; the genetic approach to elucidation of mechanisms governing pathogenicity and disease resistance; fungicides (their commercial development, evaluation, uptake and translocation by plants); the chemistry of fungicides; soil microbiology and root-disease fungi; concepts and problems of nematology; the structure of viruses; the multiplication of plant viruses; and the epidemiology of plant diseases. In addition the introductory or concluding comments of the chairman of the symposium are usually recorded.

The individual reviews are informative, authoritative, comprehensive, and well-documented and this notable volume besides its immediate interest as an up-to-date survey of the theory and practice of plant pathology will have a permanent value as a work of reference.

Scientific Institutions and Scientists in Latin-America. Paraguay Vol. 1; Chile Vol. 2.—93 pp.; 253 pp., Unesco, Montevideo, 1959. [Span., Engl., Fr. intros.]

Vol. 1 contains the 1st annotated list of Paraguayan scientists and scientific organisations. Vol. 2 is a revised list giving many institutions and scientists not listed previously.

Imshenetskiĭ (A. A.) (Editor). Достижения советской микробиологии. [The achievements of Soviet microbiology.]—128 pp., Moscow, Acad. Sci. U.S.S.R., 1959. Roubles 5.75.

This book [cf. **38**, 182] contains four articles reviewing different aspects of the field. Under the title 'Achievements of general microbiology' (pp. 3–45), the editor reviews the past 40 yr. S. I. Kuznetsov contributes a paper on the 'Achievements of Soviet microbiology in the field of research on the geological activity of micro-organisms' (pp. 46 65; 3½ pp. ref.). A survey of 'Technical microbiology in the U.S.S.R. during the last 40 years' is presented by V. N. Shaposhnikov, N. D. Ierusalimskiĭ, & Mme I. L. Rabotnova (pp. 66–83; 3 pp. ref.), while E. N. Mishustin gives a detailed account of 'Achievements in the field of soil microbiology in the U.S.S.R.' (pp. 84–128; 7½ pp. ref.).

Efimov (A. L.). Краткий справочник по применению ядов для борьбы с вредителями и болезнями растений. [Concise handbook on the use of toxic substances in the control of pests and diseases of plants.] –294 pp., Moscow, Sel'khozgiz, 3rd enlarged ed., 1959. Roubles 3.75.

Following a brief introduction and general discussion of chemicals used for the control of pests and diseases of agricultural crops the individual preparations are discussed at varying length. Information is provided on the methods of application, dosage, and suitability for the control of different diseases. Much detail is provided in tabular form and there are 18 schedules with details of the preparations to be used against diseases of different crops. Various other aspects of the subject are discussed.

Ruzinov (P. G.), Okhova (Mme E. P.), Kanaeva (Mme I. Ya.), Smilyanets (L. E.), Lukashevich (P. A.), & Serbulov (A. F.). Вредители и болезни овощных культур в Молдавии и меры борьбы с ними. [Pests and diseases of vegetable crops in Moldavia and measures for their control.]—128 pp., 39 fig., Kishinev, State Publishers of Moldavia, 1957, Roubles 1.60. [Received Mar. 1960.]

This publication begins with a general section on agrotechnical, physico-mechanical, biological, and chemical control measures (pp. 7–20) with a chapt. on seed disinfection (pp. 21–24). Problems of pests and diseases are treated separately for nursery (pp. 24–33) and field crops (pp. 33–76), the latter by hosts. A chapt. on storage diseases (pp. 76–81) is succeeded by a table setting out the control measures to be taken each month (pp. 82–97). The last sect. deals with machinery for control: sprayers (pp. 98–111), dusters (pp. 111–125), and apparatus for seed treatment (pp. 125–127).

Leifson (E.). **Atlas of bacterial flagellation**—New York & London, Academic Press, 171 pp., 69 fig., 1960. $7.

In this beautifully illustrated book the author has shown in photomicrographs of stained preparations the shape and arrangement of flagella of representative strains of all known spp. of bacteria. Techniques are described for demonstrating motility, preparing cell suspensions, cleaning slides, and for staining bacterial flagella by the author's well-known method. There follow sections on flagellar shape and arrangement, and variation and mutation, together with a detailed description of the flagellation in each genus. The wavelength in μ of the undulation of the flagella of each strain is given after the photomicrographs, representing phytopathogenic pseudomonads, 10 *Xanthomonas* spp., 5 *Agrobacterium* spp., 8 *Erwinia* spp., and 2 plant pathogenic corynebacteria.

Matyshevs'ka (Mme M. S.). Вплив умов зовнішнього середовища на формування паразитизму у фітопатогенних бактерій. [The effect of environmental conditions on the development of parasitism in phytopathogenic bacteria.] – *J. Microbiol., Kiev*, **21**, 5, pp. 58–65, 1959. [41 ref.]

In this review the importance of the influence of environmental conditions both on the conversion of saprophytic to pathogenic forms and on the change of virulence in pathogenic bacteria is confirmed [cf. **39**, 82].

Klement (Z.) & Lovas (B.). **Biological and morphological characterization of the phage for Xanthomonas phaseoli var. fuscans.**—*Phytopath. Z.*, **37**, 4, pp. 321–329, 6 fig., 2 graphs, 1960. [Germ. summ.]

This paper has been noticed from another source [**38**, 727].

Dye (D. W.). **Pectolytic activity in Xanthomonas.**—*N.Z.J. Sci.*, **3**, 1, pp. 61–69, 5 fig., 1960.

At Bact. Dept, Edinburgh and E. of Scotland Coll. of Agric., Edinburgh, 145 cultures representing 38 spp. of *Xanthomonas* [**38**, 300] were tested for ability to liquefy a pectin gel and to produce pectin methylesterase, pectin polygalacturonase, and protopectinase, the last by means of a cantilever potato slice method in which $\frac{1}{2}$ the slice was suspended over a trough in agar and broke off when macerated. Because of str. variation, the ability for pectin liquefaction or of producing specific pectic enzymes is considered to have little value for species differentiation of xanthomonads. Enzymes disintegrating plant tissue may be more important in infections caused by xanthomonads than previously recognized, e.g. in infections caused by *X. hyacinthi* and *X. campestris*.

Grula (E. A.). **Nutritional control of cell division in a species of Erwinia.**—*Proc. Okla. Acad. Sci.*, **39**, pp. 106–109, 1959. [*Biol. Abstr.*, **35**, 6, p. 1294, 1960.]

On agar containing dextrose, sucrose, mannitol, galactose, or pyruvic acid the cells of an *Erwinia* sp. were 15–30 μ long and the colonies rough. In the absence of such C sources the cells were about 1·5 μ long and the colonies smooth. In chemically defined media 5 amino acids (D isomer only) each inhibited division, the cells then growing up to 300 μ in 14–16 hr. before lysis of most. The amino acid effect could be reversed by ammonium salts, D or L α-alanine, p-aminobenzoic acid, isoleucine, or pantothenic acid.

Sarger (J.). **Étude de l'influence des traitements aux hormones de croissance sur le développement de tumeurs infectueuses sur boutures de Prunus cerasifera.** [A study of the influence of treatments with growth hormones upon the development of infectious tumours on cuttings of *P. cerasifera*.]—*Rev. hort., Paris*, **132**, 2233, pp. 2164–2165, 6 fig., 1960.

As a result of the observation that when fruit trees destined to be used for stocks were treated with growth substances to encourage rooting the substances tended to increase any bacterial galls already present on the roots or crown, experiments were initiated at the Sta. d'Arboriculture fruitière, La Grande Ferrade, France, in which *P. cerasifera* cuttings untreated and treated with 1 and 0·1% β-indole-acetic acid and 1% β-indole-butyric acid were planted in sterilized soil and in soil mixed with ground-up galls of *Agrobacterium tumefaciens* from nursery seedlings. In the inoculated soil the growth substances favoured the development of galls, which appeared to be of bacterial origin. Further investigations are to be made.

Bonnier (C.). **Sur les relations entre le 'crown-gall' et les nodosités radiculaires des Légumineuses.** [On the relations between crown gall and the root nodules of Leguminosae.]—*C. R. Soc. Biol., Paris*, **103**, 11, pp. 1883–1885, 1959.

It was demonstrated at the Inst. Agron. de l'État, Gembloux, Belgium, that a str. of *Agrobacterium tumefaciens* was able to induce crown gall on various plants and also root nodules on lucerne comparable to those of *Rhizobium* sp.

Gabriel (B. P.). **Fungus infection of insects via the alimentary tract.**—*J. Insect Path.*, **1**, 4, pp. 319–330, 6 fig., 1959.

In experiments at Coll. Agric., Univ. Philippines, Los Baños, Laguna, fewer infections developed in larvae of *Galleria mellonella*, *Bombyx mori*, and *Tenebrio molitor* following micro-feeding with conidia of *Metarrhizium anisopliae* [cf. **37**, 517] than when inoculum was applied to the outside of the integument. With *Beauveria bassiana* [cf. **39**, 377 *et passim*] the results were variable but the general trend was similar.

The germination of conidia of *B. bassiana* in the intestinal contents of *G. mellonella* and *T. molitor* was moderate, in that of *B. mori* low, and in *Peridroma margaritosa* nil. *M. anisopliae* germinated profusely in the intestine of *G. mellonella*, while the incidence in *B. mori* and *T. molitor* was low, and in *P. margaritosa* very low. Germination of both spp. was abundant in 2% peptone water, nil to very low in water, and profuse in the blood of all the insects except the last-named, in which it was nil.

LAIRD (M.). **Fungal parasites of Mosquito larvae from the Oriental and Australian regions, with a key to the genus Coelomomyces (Blastocladiales : Coelomomycetaceae).**—*Canad. J. Zool.*, **37**, 5, pp. 781–791, 8 fig., 1959. [16 ref.]

In further studies [cf. **35**, 891] 2 new spp., viz. *C. finlayae* Laird, parasitizing the larvae of *Aëdes notoscriptus*, and *C. macleayae* Laird on *A.* sp., both from Queensland, are described. The former has resting sporangia 31·5–47·5 × 17·8–27·5 μ and the latter 34·6–53·4 × 16·8–28·1, both with pitted and ridged walls.

A new var. of *C. stegomyiae*, var. *rotumae*, parasitizing *Aëdes* (*Stegomyia*) sp. in Rotuma Island, Fiji, produced smooth-surfaced brownish-yellow sporangia, 39·8–60·1 × 19·5–30·1. Also described are *C. s.* var. *stegomyiae* from Singapore, *C. indiana* from Cambodia, and *C. cribrosus* from British N. Borneo.

An identification key to 21 spp. uses sporangial ornamentation as the basic criterion. The possibility of biological control of mosquitoes by these fungi is discussed [cf. **26**, 488].

MAYER (H. R.). **Großräumige Pflanzenschutzmaßnahmen im Jahre 1959.** [Large-scale plant protection measures in 1959.]—*Pflanzenschutz*, **11**, 11, pp. 157–158, 160–162, 164, 1959.

Details of the activities of the plant protection service in Bavaria [cf. **39**, 266], including area covered, warning service [cf. **38**, 458], which is now becoming increasingly concerned with widely varying local conditions and attracting greater attention from farmers, and control measures carried out.

MUMFORD (D. C.). **Pesticide applications ; commercial charges.**—*Bull. Ore. agric. Exp. Sta.* 571, 23 pp., 1 map, 3 fig., 1959.

Further information (1957) is supplied on material previously summarized [**38**, 57].

YEAGER (C. C.). **Fungicides and bactericides : their applications and uses.** *Canad. Text. J.*, **76**, 26, pp. 42–46, 3 fig., 1959.

Up-to-date information is summarized and tabulated on the disinfectant and other properties, including stability, toxicity, odour, colour, and effects on the textile fabric of 15 fungicides, including $Cu(NH_4)_2CO_3$, Cu-3-phenyl salicylate, rosin amine D acetate, salicylanilide, and *o*-phenylphenol.

The efficiency and stability of Cu-8-quinolinolate are rated 'excellent' and its toxicity 'very low'; it is also non-injurious to the fabric. Rosin amine D pentachlorophenate is designated 'very good' in respect of efficiency with 'very low' toxicity, while the same efficiency rating is applied to penta- and tetrachlorophenol, but their toxicity is 'high' and their effects on the fabric 'severe'. Cu naphthenate is rated 'good' and its toxicity 'low', but it has a 'strong, unpleasant' odour and its action on the fabric is 'severe'. Dihydroxydichlorodiphenylmethane, ziram, Zn-2-mercapto benzothiozole, Na pentachlorophenate, and phenyl Hg salts are also designated 'good', with 'low', 'very low', 'very low', 'high', and 'very high' toxicities, respectively; Na pentachlorophenate produces 'severe' effects on the material and the stability of the phenyl Hg salts is 'very poor'.

Rudnev (D. F.) & Bratus' (V. N.). Краткий справочник по применению ядохимикатов для борьбы с вредителями и болезнями зеленых насаждений. [Concise handbook for the use of toxic chemicals in the control of pests and diseases of green crops.]—143 pp., Kiev, State publishers of literature on the construction and architecture of the Ukrainian S.S.R., 1959.

Under the heading 'Diseases of Plants' (pp. 24–30), brief descriptions are given of the main fungus diseases. Fungicides are discussed (pp. 100–129) with special sections devoted to the S and Hg groups, followed by a miscellaneous section. Tables are provided with information on times of application, dosage, and method in relation to specific diseases.

Mel'nikova (Mme N. N.) (Editor). Органические инсекто-фунгициды и гербициды. [Organic insecto-fungicides and herbicides.]—360 pp., 2 pl., 5 diag., 8 graphs, Goskhimizdat, Moscow, 1958. Roubles 17.20.

This is a collection of papers from the Y.V. Samoĭlov sci. Inst. for Fertilizers and Insectofungicides containing a section on seed dressings and fungicides. A study of 'Halogen derivatives of aromatic hydrocarbons for treating cereal seed against smut' by Mme N. N. Mel'nikova, Mme A. V. Skalozubova, & Mme A. S. Deshevaya (pp. 304–306) elucidated the fungicidal activity of a number of chlorine and bromine derivatives of benzene and naphthalene on spores of powdery smut [*Sphacelotheca destruens*: cf. **38**, 595] of millet [*Panicum miliaceum*]. High activity was shown for 1,2,4-trichlorobenzene and tetrachlorobenzene. In 'The toxicity of cotton seed dressings for the natural antagonists of gummosis' (pp. 306–310) Mme A. S. Deshevaya & Mme E. I. Andreeva present the results of testing NIUIF-2 (granosan), 20% Cu trichlorophenolate, and 20% Na trichlorophenolate on natural antagonists of gummosis [*Xanthomonas malvacearum*: cf. **39**, 25] present both in the soil and on cotton seed. NIUIF-2 (6–8 kg./m.) strongly inhibited *Bacillus mesentericus* and 90% of 22 actinomycete strs., only slight inhibition of 60% occurring with the other 2 materials. 'On the effect of new preparations on the germination of maize seed' (pp. 311–314) by Mme A. S. Deshevaya & Mme E. A. Martynova indicates the possibility of using 50% thiram [**38**, 690] for dressing maize seed and the desirability of further trials with other fungicides. Tables 3–4 (pp. 346–359) on compounds used as fungicides and those used as bactericides give full chemical details of 412 compounds and dosages.

Zelepukha (Mme S. I.). Третя нарада проблеми фітонцидів. [The third conference on the problem of phytoncides.]—*J. Mikrobiol., Kiev*, **22**, 1, pp. 68–71, 1960.

At this conference, convened 22–25 July, 1959, in Kiev by the Inst. of Microbiol., Acad. Sci. Ukrainian S.S.R., and the A.O. Zhdanov Leningrad Univ., many papers were devoted to the role of phytoncides [**38**, 573] in the life of plants, their importance in the formation of natural plant associations, and their connexion with the vital activities of plants and metabolism. Others presented the results of studies on the production of phytoncides by plants in relation to age, vegetative period, effects of light, resting period, etc. There were a series of reports on the importance of phytoncides in plant resistance to bacterial and virus diseases. D. D. Verderevs'kiĭ (Kishinev) dealt with immunity in plants, and colleagues illustrated the position with experimental data, including the inactivation of tobacco mosaic virus by saps from resistant tobacco and tomato vars., the bactericide properties of sap of cotton plants immune from gummosis [*Xanthomonas malvacearum*: cf. above], and the specific action of the leaf sap of resistant vines on the zoospores of the vine mildew fungus [*Plasmopara viticola*]. Mme K. G. Bel'tyukova (Kiev) & R. M. Galachyan (Erevan) discussed the importance of phytoncides as factors for increasing resistance to bacterioses of tomatoes and cabbages, while

Mme T. A. Sorokina (Moscow) reported on their role in influencing the selection of micro-organisms in root systems. Mme K. G. Bel'tyukova & L. T. Pastushenko (Kiev) communicated positive results of studies on the antibiotic action of a preparation from wild hemp (konsatin 2) against bacterioses of potato and for dressing tomato seed before sowing. A. D. Bobȳr (Kiev) employed imanin, as well as arenarin [**39**, 351] for the control of TMV in tobacco. Mme M. I. Nikolaeva (Voronezh) studied preparations from garlic, onion, mustard [**39**, 389] etc., as well as konsatin 2, arenarin, and setin for the control of mycoses of maize and concluded that they can improve seed health and give protection. N. A. Cheremisinov & Mme N. I. Bandȳsheva (Voronezh) also reported that they had successfully used phytoncides of garlic and onion for the disinfection of maize seed and increasing its resistance to fungal diseases. M. M. Rodigin (Saratov) presented data on the use of garlic phytoncides for the control of powdery smut [*Sphacelotheca destruens*] of millet [*Panicum miliaceum*: cf. above], wilt of Siberian larch seedlings, and rotting of potatoes in store.

Owens (R. G.) & Novotny (Helen M.). **Mechanism of action of the fungicide captan (N-(trichloromethylthio)-4-cyclohexene-1,2-dicarboximide).**—*Contr. Boyce Thompson Inst.*, **20**, 3, pp. 171–190, 12 graphs, 1959.

Accumulation of inorganic phosphate in *Neurospora sitophila* spores poisoned by captan, regardless of whether various phosphate acceptors were added, indicated blockage of P metabolism. There was evidence that the toxicity of captan is due to the intact molecule, and not to decomposition products.

Burchfield (H. P.). **Comparative stabilities of dyrene, 1-fluoro-2,4-dinitrobenzene, dichlone and captan in a silt loam soil.**—*Contr. Boyce Thompson Inst.*, **20**, 3, pp. 205–215, 4 graphs, 1959.

Stability was in the order captan > dichlone > 1-fluoro-2,4-dinitrobenzene > dyrene. Colorimetric analysis of reactive halogen indicated that 50% of the dyrene [cf. **38**, 182] added to moist soil disappeared within ½ day, compared with 3–4 days for captan. Breakdown was much slower in air-dried soil.

Meagher (W. R.), Anderson (C. A.), Gonter (C. Ellen), Smith (S. B.), & MacDougall (S.). **Colorimetric method for the determination of dyrene residues in plant material.**—*J. agric. Fd Chem.*, **7**, 8, pp. 558–561, 1959.

This method from the Chemagro Corp., Kansas City, Mo., and Pittsburgh Coke and Chemical Co., Pa, for the microdetermination of dyrene [cf. above and below] as a spray residue involves acid hydrolysis to form *o*-chloroaniline, which is diazotized and coupled with *N*-1-naphthylethylenediamine to produce a magenta colour measurable spectrophotometrically at 540 m μ.

Barry (D. L.) & Lisk (D. J.). **Determination of dyrene in Apples by application of the Zincke reaction.**—*J. agric. Fd Chem.*, **7**, 8, pp. 560–561, 1959.

Tissue is extracted with acetone and the resultant filtrate extracted with $CHCl_3$. The evaporated extract is taken up in benzene and chromatographed on Al_2O_3 to remove interferences. The Zincke reaction with pyridine and alkali (*J. agric. Fd Chem.*, **6**, 106–111, 1958) is used for the detection of dyrene, recovery of which averaged 97±10%. Analysis of the entire $CHCl_3$ extract from a 100-g. sample revealed about 0·05 p.p.m. Residues on samples of Cortland apples sprayed 5 times (2 lb./100 gal.) between May and Sept. 1957 were approx. 1 p.p.m.

Kane (P. F.) & Gillespie (K. G.). **Determination of dyrene and cyameric chloride in technical materials.**—*J. agric. Fd Chem.*, **8**, 1, pp. 29–32, 4 graphs, 1960.

At the Chemagro Corp., Kansas City, Mo., treatment of dyrene [see above], previously known as kemate or B-622, under reflux with 1 N NaOH for 10 min. causes

the release of both the Cl atoms on the $C_3N_3Cl_3$ ring. Under the same conditions the 3 Cl atoms in $C_3N_3Cl_3$ are liberated. On the other hand, refluxing with water releases all the Cl from $C_3N_3Cl_3$ in 20 min. but none from dyrene.

Kovács (A.) & Falchieri (F.). **Saggi di dilavamento di fungicidi in laboratorio.** [Laboratory tests of the leaching of fungicides.] *Ann. Sper. agr.*, N.S., **14**, 1, *Suppl.*, pp. cxxv–cxxxiii, 1 fig., 3 graphs, 1960. [Engl. summ.]

At Ist. Pat. veg., Univ. Bologna, disks of leaves of *Ligustrum* sp. and *Prunus laurocerasus* and of polythene were treated with 0·3% suspensions of zerlate, tiezene, and pomarsol forte and with 1% Bordeaux mixture, dried, and submitted to artificial rain [cf. **38**, 566] equal to 0, 10, 31, and 92 mm. Retentions were determined by agar diffusion using *Saccharomyces carlsbergensis*. Bordeaux lost little of its activity, while tiezene and pomarsol were washed away in larger quantities. The efficacy of zerlate against the test organism was much reduced after the 1st 10 mm. of rain, but thereafter its resistance was as great as that of Bordeaux. Tenacity of the fungicides was greater on the leaves than on the polythene.

Jaques (R. P.), Robinson (J. B.), & Chase (F. E.). **Effects of thiourea, ethyl methane and some dithiocarbamate fungicides on nitrification in Fox sandy loam.**—*Canad. J. Soil Sci.*, **39**, 2, pp. 235–243, 3 graphs, 1959.

The soil percolation technique was used in these studies at the Ontario agric. Coll., Guelph. The fungicides ferbam, ziram, zineb, and manzate caused a lag in nitrification of 150 days when added to percolation units (50-g. portions of the 25-mm. crumb fraction of air-dried soil) at $2{\cdot}1 \times 10^{-3}$ M kg. Ferbam appeared to inhibit the NO_2 oxidizing bacteria as well as the NH_4 oxidizing organisms.

Control of Botrytis achieved. Protection for Lettuce, Tomato and Tulip.—*Chem. & Ind. (Rev.), 1959*, 34, pp. 1065–1066, 1 fig., 1959.

Recommendations are given for the application of allisan, a new formulation containing 4% of a nitrated chloroaniline derivative produced by Boots Pure Drug Co. Ltd., Nottingham, after 15 yr. research and development work. It has been found effective against *B. cinerea* on lettuce and tomato and *B.* [*tulipae*] on tulip. The cost of treating 100 sq. yd. of lettuce bed is 22*s.*, working out at approx. 2% of a crop, assuming an av. return to the grower of 5*d.* lettuce. The av. size of plants treated with allisan is 1½ times that of those receiving tecnazene. At a conservative estimate based on field trials, with a national under-glass lettuce acreage of 15,000, an annual min. saving to the industry of £1,000,000 is clearly indicated.

In seed-beds the fungicide should be applied at ½–1 oz. sq. yd. Seedlings should be dusted at monthly intervals after formation of the 1st true leaves with ½ oz./sq. yd. Treatment of beds in houses with 1 oz./sq. yd. suffices if the crop is to be cut within 12 weeks of planting.

For the control of 'fire' on tulip allisan is used as a 'fog' at the rate of ½ oz./sq. yd. On tomato plants a thick paste prepared by the addition of water is applied to areas affected by stem rot [*Didymella lycopersici*].

Peri (C. A.). **Derivati arseno-organici ad azione antiparassitaria.** [Arseno-organic derivatives with anti-parasitic action.]—*Gazz. chim. ital.*, **89**, 5–6, pp. 1315–1323, 1959.

A full account is given of laboratory tests at the Istituto Ricerche Antiparassitari Società Montecatini, Milano-Linate, Italy, to determine the efficiency of 2 classes of organic derivatives of As, carrying either alkyl dithiocarbonic or dialkyldithiosphoric radicals, as inhibitors of the mycelial growth of *Alternaria tenuis*, *Aspergillus niger*, *Penicillium roquefortii*, and *Saccharomyces ellipsoideus*. In most cases the results were satisfactory.

Khristov (A.). Колоидната сяра — най-добрият заместител на Бордолезовия разтвор в овощарството. [Colloidal sulphur –the best substitute for Bordeaux mixture in fruit-growing.]—Овощарство [*Ovoshtarstvo*], **7**, 3, pp. 24–26, 1960.

In the effort to overcome a scarcity of colloidal S a recipe is given for its preparation on a small scale. A mixture of lime-sulphur (18° Beaumé) at 2 l., 3 l. water + 200 g. sulphite liquor worked together with 90 g. $KMnO_4$ 3 l. water gives a thick S suspension which, diluted in 200 l., is recommended for the 1st post-blossom spray, and in 400 l. for later summer sprays. The coverage and efficiency of colloidal S are approx. the same as those of 1% Bordeaux mixture, while the cost of 100 l. active 0·2% solution is only 1–2 lv., compared with 3·40 lv. for the same quantity of the latter.

Courshee (R. J.). **Investigations on spray drift. Part I. The small drop component of sprays.**—*J. agric. Engng Res.*, **4**, 2, pp. 144–152, 2 fig., 1 diag., 6 graphs, 1959. [Fr., Germ. summ.]

The tendency of the smallest drops to drift is an important factor in spraying. At the hort. Engng Dept, N.I.A.E., Wrest Park, Silsoe, Beds., the most suitable method found for estimating droplet size was to allow the spray to pass for a moment vertically downwards through a thin slit between 2 inclined plane surfaces into a draught-free chamber with a glazed paper floor, previously calibrated for the ratio stain size: droplet size at the spray impact velocities used.

The passage of the jet spray through the slit seemed likely to cause sampling errors, which are described, due to various factors such as droplets grazing the edge, the tendency for the smaller droplets to be diverted, and the unavoidable inclusion of some droplets (arising from impact on the inclined planes) not strictly belonging to the sample. Tests (which are detailed), however, indicated that the fine-spray fraction can readily be measured by this method to within 1% of the sample vol. Higher precision involves much more trouble and expense.

Nordby (A.) & Steenberg (K.). **Application of radioactive plant protection chemicals for illustration and quantitative evaluation of spray deposits.**—*J. agric. Engng Res.*, **4**, 2, pp. 174–180, 3 fig., 4 graphs, 1959. [Fr., Germ. summ.]

At the Norwegian Inst. agric. Engng, Vollebekk, orthocide, dithane, and sulfinox were rendered radioactive by neutron irradiation in a nuclear reactor. Single leaves from field plants sprayed with these fungicides were assayed quantitatively for the amount of adherent fungicide, and others were examined for distribution pattern [cf. **39**, 380, 481] by being placed in close contact with X ray film. The resultant 'radio-autograms' gave a good idea of the coverage, and, if the contact between film and leaf was good, some information as to particle size. By sampling before and after rainfall loss by run-off could also be estimated. The coverage achieved on 4–5 m. high Torstein apple trees with a portable mist sprayer was equivalent to that with tractor-drawn mist sprayers.

Körnlein (M.) & Seibel (M.). **Versuche zur Abtötung von Bakterien und Schimmelsporen in Kunststoffbeuteln durch Äthylenoxyd.** [Tests on killing bacteria and mould spores in plastic bags by ethylene oxide.] *Neue Verpackung*, **12**, 10, pp. 716–719, 1959. [26 ref.]

Experiments by Farbwerke Hoechst, Frankfurt a. M.–Höchst, and Kalle & Co. AG, Wiesbaden-Biebrich, Germany, demonstrated the efficiency of ethylene oxide (diluted with 90% CO_2 to avoid explosion hazards) at normal temp. and pressure for 5–10 min. as a substitute for heat sterilization where the potential survival of 1 bacterium or spore (*Aspergillus niger*) in ½–1 million is unobjectionable. The organisms surviving this rapid treatment are largely resistant to more drastic procedures (50° C. and 5–50 atm. pressure for up to 150 min.), so that absolute

sterilization by the experimental method would be uneconomic. Of the 2 organisms used for inoculation of the bags, *A. niger* succumbed more readily than *Bacillus subtilis*.

1960 pest and disease control program.—*Leafl. Calif. agric. Exp. Sta. ext. Serv.* 70–81, (folders), 1960.

This useful series, issued by the Div. of agric. Sci., Univ. Calif., has been revised and covers figs, pears, cherries, olives, apricots, bushberries, apples, plums and prunes, peaches and nectarines, grapes, walnuts, and strawberries, respectively. Spraying tables are accompanied by relevant notes.

In the same format are *Leafl.* 110 (*1959*) on yellow stain of cotton lint (*Aspergillus flavus*) [cf. **38**, 477] and *Leafl.* 46 (*1955*), 3 col. fig., on virus diseases of sugar beets in Calif., which replaces *Circ.* 422.

McKnight (T.). **The changing pattern of plant diseases.**—*J. Aust. Inst. agric. Sci.*, **26**, 1, p. 79, 1960.

In relation to the changing pattern of agriculture in the Darling Downs area, Qd, the author notes that in the last 10 yr. new biotypes of wheat stem rust [*Puccinia graminis*: **33**, 208] have appeared, wheat crown rot (*Gibberella zeae*) has occurred in epidemic proportions, *Sphaerella* [*Mycosphaerella*] *linorum* [**33**, 209] has affected linseed and *Piricularia grisea* [**27**, 221; **29**, 202] *Setaria* crops, numerous bacteria and fungi have been found in grain and forage sorghums, and cowpea has been affected by red stem canker (*Phytophthora* [*vignae*, **38**, 112 *et passim*]).

De ontwikkeling van de voorlichting over planteziekten- en onkruidbestrijding. [The development of information concerning plant disease and weed control.] —*Landbouwvoorlichting*, **17**, 3, pp. 99–105, 1960.

This report on the deliberations of a Commission appointed by the Director of Agric. and Pastures (Netherlands) contains proposals for improved methods of organization of the information service, with particular reference to increased co-operation between specialists and practical workers.

Котев (S.) & Nakov (B.). Вярно и точно да предвиждаме проявлението на болестите и неприятелите по овощните култури. [True and exact forecast of the occurrence of diseases and pests in fruit crops.]—Овощарство [*Ovoshtarstvo*], **7**, 3, pp. 26–29, 1960.

A report from the forecasting and warning stations in Kostinbrod and Proslav, Bulgaria, on the organization of their work and an evaluation of their services.

Diercks (R.). **Pflanzenschäden durch Rauchabgänge unter besonderer Berücksichtigung einiger Schadensfälle in Oberbayern.** [Plant damage caused by smoke pollution, with particular reference to examples in Upper Bavaria.]—*Pflanzenschutz*, **11**, 11, pp. 151–157, 10 fig., 1959.

This general note from the Bayer. Landesanstalt für Pflanzenbau und Pflanzenschutz, Munich, on the nature of smoke pollution and on the cautious attitude which should be adopted by any plant protection advisory officer called in to advise, is illustrated by 3 typical cases, involving a coal-burning central-heating installation and 2 brick kilns [cf. **38**, 491].

Moritz (K.). **Beseitigung von Schimmelstellen und feuchten Flächen in Papierfabriken.** [Elimination of mould patches and damp surfaces in paper factories.] —*Allg. PapRdsch.*, *1959*, 12, pp. 598–600, 4 fig., 4 diag., 1959.

This information has been noticed [**39**, 7].

Nyuksha (Mme Y. P.). Микроскопическое изучение бумаги, пигментированной грибом **Gymnoascus setosus.** [Microscopic study of paper stained by the fungus *Gymnoascus setosus*.]—*Microbiology, Moscow*, **29**, 1, pp. 133–136, 2 pl., 1960. [Engl. summ.]

From the M. E. Saltykov-Shchedrin State Public Library, Leningrad, it is reported that staining produced by the highly destructive *G. setosus* [**35**, 534] is dependent on the type of paper. Clear raspberry-red stains appear on paper milled with chalk, the colour being fainter on other types or almost nil on newspaper. The stain is usually max. at pH 5·4–5·1, and it fluoresces under UV light, which distinguishes it from the red stains produced by *Penicillium* and *Aspergillus* spp. The coloration results from staining of the lignin, oxycellulose, products of cellulose destruction, and sizing substances and also from the presence in the paper of a large quantity of stained mycelium. Purified cellulose does not absorb the pigment. In the first stages of mycelial development the fungus is hyaline, and sometimes even during fibre destruction may not form pigment. The hyphae do not exceed 1 μ diam. and frequently are only 0·5 μ. They are ranged mostly along the fissures, broken edges, and striations of the fibres, sometimes penetrating them or entwining them to form a net on the surface. Other hyphae, usually thicker, pass between the fibres and form a very dense mesh in the deeper layers. As pigmentation increases the hyphae die, and their decomposition products, small pieces of stained cell content, remain inside the invaded fibres. Severe damage occurs and the fibres, particularly small ones, become strongly granulated.

Plant quarantine announcements. —*F.A.O. Pl. Prot. Bull.*, **7**, 11, pp. 149–150; **8**, 2, pp. 23–24; **8**, 3, pp. 33–36, 1959.

Details are given of regulations dated 10 Apr. 1959 concerning the importation into Nicaragua of fruit and vegetables; they were published in *La Gaceta*, **63**, no. 101, and came into force on 9 May 1959.

A Foreign Quarantine Notice of 14 May 1959, published in *Fed. Reg.*, **24**, 4023, 19 May 1959, amends the Nursery Stock, Plants and Seeds Quarantine (Quarantine 37) Act and prohibits the importation into U.S.A. of seeds of *Lens* spp. from all S. American countries on account of a form of *Uromyces fabae*.

The Plant and Animal Quarantines and the Plant and Animal Quarantine Regulations, United States Trust Territory of the Pacific Islands, have been amended, and the provisions now governing the importation of plants from areas outside the Trust Territory are given.

Details are given (pp. 23–24) of the Order of the Minister of Agriculture, Poland, of 28 Mar. 1959 (*Dzienn. Ustaw Polsk. Rzeczpospolitej Ludowej* 28, 6 May 1959), which relates to plant quarantine at the frontiers.

The provisions of Statutory Order No. 229 of 28 May 1959 (*Svensk Författningssamling* 229, 10 June 1959), concerning the importation of plants into Sweden are summarized (pp. 33–36).

Новые карантинные правила. [New quarantine regulations.] —Защ. Раст., Москва [*Zashch. Rast., Moskva*], **5**, 2, pp. 52–53, 1960.

According to the 'Quarantine regulations for the import and use of cotton products' issued by the Min. Agric. U.S.S.R. in Nov. 1959, such products may be imported only with the proper authorization of the State Inspectorate for Quarantine and Plant Protection. All cotton fibre consignments from abroad must be certified by the recognized quarantine or plant protection services of the country of origin to be free from anthracnosis [*Glomerella gossypii*: map 317] and other diseases coming under quarantine regulations, or not occurring in the U.S.S.R.

Imshenetskiĭ (A. A.) (Editor). Труды конференции по микотрофии растений. [Proceedings of the conference on mycotrophy in plants.] 352 pp., 1 pl., 54 fig., 49 graphs, Moscow, Acad. Sci. U.S.S.R., 1955.

The report of this conference, held in Nov. 1953 under the aegis of the Inst. of Microbiol. and the Inst. of Forestry, Acad. Sci. U.S.S.R. and the Inst. of Microbiol., V. I. Lenin All-Union Acad. of agric. Sci., contains the 22 papers read at the meetings and 7 which were not read owing to the limited time available.

Voznyakovskaya (Mme Y. M.) & Ryzhkova (Mme A. S.). Массовое размножение микоризных грибов в лабораторных условях. [Large-scale propagation of mycorrhizal fungi under laboratory conditions.]—Труд. всес. н.-и. Инст. сел.-хоз. Микробиол. [*Trud. vses. n.-i. Inst. sel.-khoz. Mikrobiol.*], *1958*, 15, pp. 164–169, 1958. [Abs. in *Referat. Zh. Biol.*, *1960*, 2, p. 102, 1960.]

The fungi were grown on cabbage or potato medium with glucose and thiamine. A simple vessel for sowing the fungi is described with diagram, as well as the preparation of the seed material.

Boullard (B.). **Progrès récents dans l'étude des mycorhizes ectotrophes.** [Recent advances in the study of ectotrophic mycorrhiza.]—*Bull. Soc. bot. Fr.*, **105**, 1–2, pp. 60–93, 1958. [241 ref.]

This review discusses general works and summarizes the recent information on the anatomy and ecology of ectotrophic mycorrhiza [cf. **38**, 668; **39**, 217, *et passim*]; the conditions governing the formation of complexes; the fungi involved; the part played by them; the influence of higher plants on fungal associations; the synthesis or experimental reconstitution of the complexes; and the practical use of the information provided.

Peyronel (B.) & Fassi (B.). **Nuovi casi di simbiosi ectomicorrizica in Leguminose della famiglia delle Cesalpiniacee.** [New cases of ectomycorrhizal symbiosis in Leguminosae of the family of the Caesalpiniaceae.]—Reprinted from *Atti Accad. Torino*, **94** (*1959–60*), 3 pp., 1960. [Fr. summ.]

This further note [cf. **39**, 217] reports ectotropic mycorrhiza on 5 more members of the Caesalpiniaceae in the Belgian Congo. The morphological and anatomical characters are to be described later.

Imshenetskiĭ (A. A.) (Editor). С. П. Костычев — Избранные труды по физиологии и биохимии микроорганизмов. II. [S. P. Kostychev—Selected works on the physiology and biochemistry of micro-organisms. II.]—510 pp., 86 fig., 12 graphs, Moscow, Acad. Sci. U.S.S.R., 1956. Roubles 30.35.

The papers reprinted in this volume cover the period 1899–1933 and are presented in 3 sections: physiology and biochemistry of mould fungi (18 papers); general questions of microbiology (2); and physiology of soil and lactic acid bacteria (17).

Timofeeva (Mme A. G.), Madaeva (Mme O. S.), Gusakova (Mme E. G.), Kovylkina (Mme N. F.), Men'shova (Mme N. I.), & Novikova (Mme V. M.). Гидроксилирование прогестерона в **11α**-оксипрогестерона при помощи **Rhizopus nigricans.** [Hydroxylation of progesterone to 11α-oxyprogesterone with the help of *R. stolonifer.*]—*Bull. Acad. Sci. U.R.S.S.*, *1958*, 6, pp. 712–718, 1958. [Engl. summ. Abs. in *Referat. Zh. Biol.*, *1960*, 2, p. 78, 1960.]

The compound was formed when a solution of progesterone (opt. 1 g./l.) was introduced into deep cultures of *R. stolonifer* incubated with adequate aeration for 48–72 hr. at 27–29° [C.]. The most active producers were str. no. 7 (Moscow Univ.) [**39**, 158] and no. 16 (Leningrad Univ.), no. 7 being used for production. The best

medium was glucose-peptone with the addition of NaCl, P, and Mg, pH 4·5–5·5. Yields reached 70% the highest being attained in a 24-hr. culture, sown with 300,000–500,000 dry conidia/ml.

KIRCHOFF (W. F.). **Factors affecting the production of proteolytic enzymes by species of the Mucorales.** - *Diss. Abstr.*, **20**, 5, p. 1547, 1959.

Of 110 spp. assayed at Purdue Univ., Ind., by the filter paper disk method on casein and gelatin agars, 40 produced zones of hydrolysis of at least 15 mm. on either. *Actinomucor elegans*, *Cunninghamella elegans*, and *Rhizopus arrhizus* were selected for study of factors affecting the production of proteases. Opt. time was 48 hr. and opt. temp. 32° C. for *A. elegans* and 35° for the other 2 spp.; pH 7 was opt. for protease production in a casein-dextrose salts medium. The opt. conc. of carbohydrates was 30 g. l. Wheat bran, casein, gelatin, and klim gave the highest yields, which were increased by addition of vitamins, notably pyridoxine and thiamine.

WHITE (G. A.). **Atypical ascorbic acid oxidase of Myrothecium verrucaria.**—*Diss. Abstr.*, **20**, 6, p. 2006, 1959.

At Iowa State Univ. the mycelium of *M. verrucaria* was found to contain an atypical, surface-localized, ascorbic acid oxidase which had properties distinctly different from those of the oxidase in the spores and of the Cu enzyme in higher plants.

GUPTA (S. C.). **Effect of pectic enzymes secreted by Pythium debaryanum Hesse on the optical rotation of pectin solution.** *Sci. & Cult.*, **25**, 1, pp. 67–68, 1959.

At Bot. Dept, D.S.B. Government Coll., Naini Tal, U.P., the enzyme preparation from *P. debaryanum* [cf. **37**, 452] produced only 6% change in the optical rotation of pectin solution, whereas that from *Botrytis cinerea* caused 65% change, which confirmed earlier observations that the *P. debaryanum* enzyme causes no major breakdown of pectin in solution, but that of *B. cinerea* does. As *P. debaryanum* enzyme caused rapid reduction in the viscosity of pectin solution without changing the optical rotation, it is suggested that the fungus produces an enzyme not previously described, for which the name pectin-depolymerase is suggested. In some respects it resembles the enzyme derived from *Neurospora*.

TATARENKO (E. S.). Изменчивость плесневых грибов и условия их хранения. [Variability in mould fungi and storage conditions.] *In* Problems of the Microbiology of Foodstuffs and Fermentation, Kiev, Acad. Sci. Ukrainian S.S.R., pp. 139–143, 1958.

Fungus cultures of high biochemical activity are needed by industry. Both in the laboratory and in production these fungi frequently degenerate. At the Ukrainian sci. Res. Inst. for the Food Industry, Khar'kov, mycelial (sterile) degeneration was prevented by light, which stimulates conidial formation and depresses mycelial growth. This was only possible in the initial stages of degeneration. The formation of plicate forms was most frequently noted in *Penicillium* spp. and could be prevented in some cases by incubation at 16–18° [C.]. Tests to ascertain adequate storage methods and to increase biochemical activity indicated that the latter was maintained in cultures of *Aspergillus oryzae* stored for 18 months at 1 and 5° on Czapek agar, wort agar, bran, and rice. *A. niger* str. 574 retained its ability to produce citric acid when the spores were stored in sand, and str. 24 when stored without sand. Experimental data confirmed the correlation between the morphologico-cultural and biochemical characters for strs. of *A. oryzae*. Increase in biochemical activity was frequently noted in cultures with a tendency to degenerate, i.e. the sterile and plicate variants.

Fields (Marion L.). **The effect of cathode rays on food spoilage fungi.**—*Diss. Abstr.*, **20**, 5, pp. 1518–1519, 1959.

High levels of cathode rays were required to reduce the activity of α-amylase and sucrase of the test organism *Aspergillus oryzae* ATCC 11601. Amylase inactivation appeared to be associated with growth inhibition of the fungus, while sucrase activity was found at much higher doses than that required to inactivate the fungus.

A. flavus NRRL 485 and *A. tamarii* NRRL 427 were significantly different in resistance to irradiation. Using 3 MeV cathode rays, the death curve for *A. oryzae* was exponential, while that for *Fusarium* sp. was sigmoidal.

The growth of non-irradiated *A. oryzae* was inhibited significantly on irradiated liquid Czapek-Dox broth, but growth was stimulated when the medium was irradiated dry. There was no difference in spore germination in liquid irradiated Czapek-Dox broth and non-irradiated. The inhibition of *A. oryzae* apparently was due to the inability of the fungus to metabolize either the sucrose or other parts of the medium. Significantly, there were different growth responses on irradiated glucose-asparagine, glucose, and starch media.

Coats (J. H.). **Physiological studies concerning the formation of sclerotia in Aspergillus niger.**—*Diss. Abstr.*, **20**, 5, pp. 1544–1545, 1959.

At Purdue Univ., Ind., a number of factors, including ultraviolet irradiation, $(NH_4)_2SO_4$ utilization, and NO_3 uptake, and the efficacy of several N sources, were tested for their effect on sclerotial formation in *A. niger*. It was concluded that inhibition of several different reactions, many of which may be far removed from the pathway immediately associated with the production of an initiating compound, may prevent sclerotization.

Anderegg (D. E.). **Physiological variation among selected isolates of the fungus Diaporthe phaseolorum var. sojae in relation to pathogenicity.** *Diss. Abstr.*, **20**, 6, pp. 1989–1990, 1959.

At Ohio State Univ. single conidial isolates of *D. phaseolorum* var. *sojae*, selected from survivors of ultraviolet irradiation, differed in growth rate on dextrose and pectin media. Their virulence to tomato fruits was closely correlated with their growth on pectin medium, whereas virulence to potato tuber tissue was more closely correlated with the pectolytic activity of the pectin filtrates of the isolates. The 2 correlations were modified by a correlation with the cellulytic activity of the fungus filtrates. These data are considered evidence that pectolytic and cellulytic enzymes are important in the nutrition of the fungus within the host tissue.

Matto (A.). **Su alcune modificazioni indotte dal sale di zinco dell' N-ossi-2-piridinetiolo in Gloeosporium musarum Cke et Massee.** [On some modifications induced by Zn salt of N-oxy-2 pyridinethiol in *G. musarum*.]—*Nuovo G. bot. ital.*, N.S., **66**, 1–2, pp. 301–309, 1 pl., 1959. [Engl. summ.]

Cultures of *G. musarum* treated with this compound at Ist. Pat. veg. Univ. Turin gave a new str. with an abundant aerial mycelium containing no alanine, conidia abnormal in shape and size and not produced in acervuli, no appressoria, more resistant to Zn pyridinethiol than the original str., and less pathogenic to banana fruits. The new str. also differed in the appearance of the nuclei and nuclear division in the conidia.

Goldberg (H. S.) (Editor). **Antibiotics, their chemistry and non-medical uses.**—x+397 pp., 17 fig., 12 graphs, Princeton, New Jersey, D. Van Nostrand Co., Inc., 1959. $15.00.

This valuable book provides the 1st adequate summary of non-medical advances

in the study and application of antibiotics. An introductory chapt. (H. S. Goldberg & T. D. Luckey) is followed by others on the chemistry of antibiotics (P. P. Regna); their use in animal nutrition (T. D. Luckey); their influence on plants and use in plant disease control (R. N. Goodman; pp. 323–448, 376 ref.); applications in food preservation (C. L. Wrenshall); uses in the isolation and cultivation of micro-organisms (H. S. Goldberg); and the public-health significance of non-medical applications of antibiotics (J. T. Logue). Goodman's account covers methods of application; the stability and persistence of antibiotics in the plant and in the soil; their compatibility with other agricultural chemicals; assay methods; the use of various additives; absorption and translocation; mode of action; and antiviral activity.

Goldberg describes, *inter alia*, the evaluation of antibiotics and their use in media for bacteria, fungi, and viruses.

The extensive bibliographies at the ends of the sections are usefully annotated.

Shemyakin (M. M.) & Khokhlov (A. S.). Химия антибиотических веществ. [The chemistry of antibiotic substances.] –653 pp., Moscow–Leningrad, Goskhimizdat, 2nd edition, 1953. Roubles 31.20. [5,041 ref.]

The 13 chapt. of the original monograph are augmented in this edition by 13 parallel supplementary chapters incorporating material to the end of 1952. There is a major chapter on penicillins (pp. 272–381, suppl. pp. 568–569) and another on streptomycins (pp. 382–444, supp. 569–570).

Krasil'nikov (N. A.). Антагонизм микробов и антибиотические вещества. [Microbial antagonism and antibiotic substances.] –340 pp., 70 fig., 4 graphs, 4 diag., Moscow, State publishing house 'Soviet Science', 1958. [6 pp. ref.]

This monograph, issued by the Ministry of Higher Education, U.S.S.R., and intended as a university manual, attempts to give a summary presentation of the available materials on the phenomenon of antagonism, antagonistic microbes, and the antibiotic substances secreted by them. A brief historical essay is followed by 'Brief data on micro-organisms' (pp. 12–62); 'Classification' (pp. 63–94); 'Antagonism' (pp. 95–142); 'Antimicrobial characters of living organisms' (pp. 143–148); 'Antibiotics' (pp. 149–222); 'Use of antibiotics in medicine' (pp. 223–241); 'Use of antibiotics in plant growing' (pp. 242–274); 'Effect of antibiotics on growth in animals' (pp. 275–290); and 'Antibiotics as a means of preserving products from putrefaction' (pp. 291–304), followed by detailed lists of antibiotics (pp. 305–331) classified under their sources.

Crowdy (S. H.), Green (A. T.), Grove (J. F.), McCloskey (P.), & Morrison (A.). **The translocation of antibiotics in higher plants. 3. The estimation of griseofulvin relatives in plant tissue.**

Crowdy (S. H.), Grove (J. F.), & McCloskey (P.). **4. Systemic fungicidal activity and chemical structure in griseofulvin relatives.**—*Biochem. J.*, **72**, 2, pp. 230–241; 241–249, 1959.

In further work [cf. **35**, 534] at Akers Res. Labs., I.C.I., Welwyn, Herts., along the same lines (*J. exp. Bot.*, **6**, p. 371, 1955), 11 substances chemically related to griseofulvin were estimated in broad bean tissues following translocation.

In these compounds no direct correlation was found between activity *in vitro* against *Botrytis allii* spores and systemic activity (reduction in leaf infection of tomato by *Alternaria solani*). Their translocation and break-down after absorption through broad bean roots was then studied, and it was found that the substances active both *in vitro* and as systemic fungicides were closely related to griseofulvin and were translocated unchanged. Those active *in vitro* but inactive systemically

failed to attain the appropriate minimal conc. in the shoots, either because they were broken down in the roots, or because their low solubility operated against translocation. Some substances extensively broken down in the tissues showed some fungicidal activity, possibly by affecting the biochemistry of the host plant. A systemic fungicide based on the griseofulvin structure should have high activity *in vitro*, coupled with chemical stability in the tissues and a low oil–water partition coefficient.

Rangaswami (G.). **Mycothricin complex, a streptothricin group of antibiotics.**—*Bull. Hindustan Antibiot.*, **2**, 2, pp. 45–48, 1959.

Most of the results, which indicated the possibilities of using mycothricin for plant disease control, have been noticed [**36**, 203; **38**, 694].

Tape (N. W.), Cappellini (R. A.), & Davis (B. H.). **Mode of action of nystatin on some filamentous fungi.**—*Phytopathology*, **50**, 2, pp. 163–169, 7 graphs, 1960. [24 ref.]

In further work at Rutgers Univ., New Brunswick, N.J., of the effect of nystatin on spore germination of *Botrytis* sp., *Diplodia tubericola*, *Monilinia* [*Sclerotinia*] *fructicola*, and *Rhizopus* sp., its uptake by fungus spores, and effect on repiration, is described. The site of action in these fungi appears to be in the oxidative part of the metabolism, probably on an enzyme in the Krebs cycle.

Ark (P. A.), Bottini (A. T.), & Thompson (J. P.). **Sodium usnate as an antibiotic for plant diseases.**—*Plant Dis. Reptr*, **44**, 3, pp. 200–203, 1960. [18 ref.]

Tests at Univ. Calif., Berkeley, with Na usnate, derived from usnic acid, an antibiotic from lichens [cf. **36**, 49], demonstrated its effectiveness against certain Gram+ bacteria, including *Corynebacterium michiganense*, *in vitro*, and against cucumber downy mildew (*Pseudoperonospora cubensis*), downy mildew (*Phytophthora phaseoli*) on Lima bean [*Phaseolus lunatus*], rust (*Uromyces phaseoli*) [*U. appendiculatus*] on bean [*P. vulgaris*], brown rot of stone fruits (*Monilinia* [*Sclerotinia*] *fructicola*), powdery mildew (*Erysiphe polygoni*) on bean, and some other fungi both *in vitro* and *in vivo*, but not against Gram— phytopathogenic bacteria. Dust formulations (1,000–2,000 p.p.m.) generally proved better than sprays. Plant injury from Na usnate developing under excessive humidity was prevented by the incorporation of 1% chlorophyllin.

De Núñez (Nydia Y. S.). **Espectro antibiótico de cepas del género Aspergillus en relación con la especie.** [The antibiotic spectrum of strains of the genus *A.* in relation to the species.] —*Rev. Invest. agric. B. Aires*, **13**, 1, pp. 19–46, 1959.

Of 1,160 strs. (51 spp.) of *Aspergillus* [cf. **25**, 227] examined at the Inst. de Microbiología Agrícola, Argentina, many were active against *Bacillus subtilis*, and to a lesser extent against *B. polymyxa*.

Parès (Yvette) & Attisso (M. A.). **Pouvoir antibiotique d'Alternaria humicola Oudemans.** [Antibiotic potency of *A. humicola*.]—*C. R. Acad. Sci., Paris*, **250**, 14, pp. 2601–2602, 1960.

A str. of *A. humicola* parasitic on *Pteris longifolia* promoted development of the prothalli and inhibited a number of bacteria. Culture filtrates yielded 4 main products, viz. a white substance toxic *in vitro* to Gram+ and Gram— bacteria but not to animals; an oily, greenish, less active substance; a white gum encouraging bacterial growth; and an inactive orange pigment. After repeated subculturing in the course of 1 yr., however, only the white gum and another antibiotic consisting of a relatively inactive yellow oil could be detected.

Tsao (P. H.), Leben (C.), & Keitt (G. W.). **The partial purification and biological activity of an antifungal antibiotic produced by a strain of Streptomyces griseus.** —*Phytopathology*, **50**, 2, pp. 169–174, 1 fig., 1960.

The antibiotic, B 74, was partly purified at Univ. Wis., Madison, by a method described. Systemic activity was demonstrated in whole tomato plants in the greenhouse and also in detached tomato leaflets placed lower surface down with their basal halves on agar containing the antibiotic, the distal halves being sprayed with *Alternaria solani*. In agar streak tests against plant pathogens B 74 completely inhibited 15 fungi but only partially 4 bacteria.

Novák (V.), Káš (V.), & Nosek (J.). **Živěna půdní (edafon).** [Soil flora and fauna (edaphon).]—285 pp., 21 pl., 84 fig., Prague, Czechoslovak Academy of Agricultural Sciences, 1959. [180 ref.; Russ., Germ. summ. Abs. in *Landw. Lit. Tschechosl.*, *1959*, 3, pp. 51–52, 1959.]

This volume deals with the problems of the phyto- and zoo-edaphon and their importance for soil fertility and soil and plant hygiene. The basic groups of micro-organisms are given and their mutual effects discussed. Emphasis is on the interdependence of the edaphon and the inorganic constituents of soil and on the edaphon dynamics as determined by soil cultivation.

Johnson (L. F.), Curl (E. A.), Bond (J. H.), & Fribourg (H. A.). **Methods for studying soil microflora–plant disease relationships.**—iii + 178 pp., 13 fig., 3 graphs, London, Mayflower Publishing Co., Ltd. (Minneapolis, Burgess Publishing Co.), 1960. 28*s*. [Mimeoprinted. 25 pp. ref.]

This manual brings together information on a large number of research methods, though no attempt is made to include all those known; there are ample references to other publications for further techniques. Many of the methods are described in detail, but only a generalized indication of some is provided. The chapt. on statistical methods includes a general discussion of the fundamental principles in relation to biological research. The titles of the chapt. are: (1) taking soil samples; (2) isolation of micro-organisms from soil; (3) qualitative and quantitative studies of soil micro-organisms without isolation in pure culture; (4) micro-organisms in the plant rhizosphere; (5) characterization of soil microbial populations; (6) isolation of antagonistic soil micro-organisms; (7) testing for antagonism in agar culture; (8) assay of antibiotics and sterile culture filtrates; (9) growth and survival of micro-organisms in soil; (10) obtaining soil solutions; (11) production of antibiotics in soil; (12) interactions between plant roots and soil micro-organisms; (13) utilization of antagonistic micro-organisms for control of soil-borne plant diseases; (14) data analysis, experimental design, and statistical procedures; and (15) formulae of selected culture media.

Grainger (J.). **A new soil disease control unit.** —*Res. Bull. W. Scot. Coll. Agric.* 25, 46 pp., 18 fig., 3 diag., 9 graphs, 1958. 1*s*. [Received Mar. 1960.]

A description of the underlying principles, construction, and operation of a machine, the use of which has already been noticed [**39**, 274].

Rÿbalkina (Mme A. V.) & Kononenko (E. V.). Микрофлора почв Европейской части СССР. [Soil microflora of the European part of the U.S.S.R.]—Acad. Sci. U.S.S.R., 1957. [Review in *Pedology, Leningr.*, *1959*, 11, pp. 118–121, 1959.]

This monograph [cf. **38**, 158] is in 2 parts. The 1st, by Mme Rÿbalkina, deals with the microflora of tundra, podzol, and chernozem soils. The specific range of bacteria in the different types of soil is first studied, followed by a comparative

study of the ecological-physiological characters of different cultures of the same spp. of a number of sporogenous saprophytes. Special attention is paid to actinomycetes, which are present in considerable quantities in most of the northern soils studied. Actinomycete content increases in the highly cultivated humus iron podzols of the N.W. provinces. The last section of this part is devoted to the study of the ecological features of some other micro-organisms of various geographical origin.

The 2nd part, by E. V. Kononenko, is concerned with active soil micro-organisms. To study these, slides with a thin coating of starch-ammonia agar were inserted in soil. This medium has no selective effect on micro-organisms. At the same time analyses were made of the group range of micro-organisms in the same soil. Vegetation tests were made with different types of soils to show the effect of soil temp. and humidity on the development of micro-organisms. They disclosed great differences between the active and potential micro-flora. Moulds showed the least requirements in humidity and warmth. Actinomycetes required a higher temp., but humidity was not very important. Fungi and actinomycetes were the most characteristic part of the micro-complex of the chernozems. The authors conclude that different types of soil differ comparatively little in their potential micro-flora, but the differences in active micro-flora are much more pronounced.

Bekker (Z. É.) & Suprun (T. P.). Исследование грибной флоры лесных почв Амурской области. [Study of the fungus flora of the forest soils of the Amur region.]—*Bot. Zh. S.S.S.R.*, **45**, 3, pp. 404–410, 2 graphs, 1960. [Numerous ref.]

At the All-Union. sci. res. Inst. for Antibiotics, Moscow, in conjunction with the Amur expedition of the Council for the Study of Productive Resources, 107 soil samples were collected in Aug. 1956 between R. Amur and R. Zeya. The species range was found to be very different from that in forest soils taken at the same depths in the European part of the U.S.S.R. [cf. **32**, 696]. Species range was determined for 3 soil types beneath different plant covers. In the top layers of brown forest soil antagonists with an antifungal activity predominate; they give way in podzols and especially in peat-gley soil to those with antibacterial action. Change of form is pronounced in all soils as depth increases.

Singer (R.). **Persoon's Synopsis 1801 as starting point for all fungi?**—*Taxon*, **9**, 2, pp. 35–37, 1960.

The proposed replacement of Fries's Systema by Persoon's Synopsis as a uniform starting-point for fungi is discussed and illustrated by a list of changes that would be necessary in the specific nomenclature of some common basidiomycetes. In view of such consequences the author considers acceptance of the earlier date inadvisable.

Mayor (E.). **Catalogue des Péronosporales, Taphrinales, Erysiphacées, Ustilaginales et Uredinales du canton de Neuchâtel.** [List of Peronosporales, Taphrinales, Erysiphaceae, Ustilaginales, and Uredinales of the canton of Neuchâtel.]—*Mém. Soc. neuchâtel. Sci. nat.*, **9**, fasc. 1, 202 pp., 1958. Swiss Fr. 30. [35 ref.]

This alphabetical list includes 8 gen. of Peronosporales, 4 of Taphrinales, 7 of Perisporiales (in addition to unidentified spp. of *Oidium*), 11 of Ustilaginales, and 28 of Uredinales, each with notes on local distribution, biology, and other data. Included are *Phytophthora erythroseptica* [map 83], found on potato in 1912 and 1913, but not seen locally since 1944; *Tilletia caries* [map 294], found on wheat wherever wheat is grown locally and also on *Triticum monococcum* at Chaumont in Sept.; and *Tilletia brevifaciens* [*T. contraversa*] abundant on wheat. *T. foetida* is not recorded.

Krusheva (Ruzha). Нови паразитни гъби за България — II принос. [Parasitic fungi new for Bulgaria. Part II.]—Науч. Труд., София [*Nauch. Trud. sel.-khoz. Inst. G. Dimitrov, Sofia*], *1959*, 7, pp. 487–494, 1959. [Russ., Engl. summ.]

The author gives an annotated list of 12 fungi new to the mycoflora of Bulgaria and describes 2 new spp., *Tiarospora deschampsiae* on *Deschampsia caespitosa* and *Ascochyta dictamni* on *Dictamnus albus*. A list of 14 new hosts for known fungi in Bulgaria is appended.

Da Costa (Maria E. A. P.). **Species aliquae mycologicae Lusitaniae.** [Some Portuguese species of fungi.]—*Portug. Acta biol.*, **6**, Sér. B, 3-4, pp. 219–231, 1959.

This annotated list of 37 fungi from the Lab. de Patologia Vegetale 'Verissimo de Almeida', gives 7 new records for Portugal; *Ascochyta imperfecta* on *Melilotus segetalis*, *Botryodiplodia mali* and *Entomosporium maculatum* [*Fabraea maculata*] on pear, *Erysiphe lamprocarpa* on *Tragopogon porrifolius*, *Phoma herbarum* var. *medicaginis* on lucerne, *Septoria tritici* on wheat, and *Tolyposporium bullatum* on *Echinochloa crus-galli*.

Noronha (E. de A.). **Lista de doenças das plantas observadas em Angola durante os anos de 1949–56.** [List of plant diseases observed in Angola during the years 1949–56.]—*Agron. angol.*, **11** (*1957–1959*), pp. 25–28, 1959.

This list [cf. **31**, 301] includes the following: *Cercospora beticola* [map 96] on beet; *Phytophthora citrophthora* [map 35] on citrus; *C. coffeicola* [map 59] on coffee spp.; *Alternaria solani* [map 89] on tomato and potato; *Colletotrichum lindemuthianum* [map 177] on bean (*Phaseolus vulgaris*); *Taphrina deformans* [map 192] on peach; *Pseudomonas solanacearum* [map 138] on potato; *Tilletia foetida* [map 295] on wheat; and *Uromyces fabae* [map 200] on broad bean.

Sprague (R.) & Lawrence (D. B.). **The fungi on deglaciated Alaskan terrain of known age (Part II), (Part III).**—*Res. Stud. Wash. St. Univ.* (formerly *St. Coll. Wash.*), **27**, 4, pp. 214–229, 1 map, 1959; **28**, 1, pp. 1–20, 1 map, 1960.

In the 1st of these further papers [cf. **39**, 218 (where 1st author's name was omitted from title of Part I)], reporting collections made at 15 stations, the presence of *Rhytisma salicinum* is noted on 15% and 20% of the leaves of the Sitka willow (*Salix sitchensis*) at 2 sites. The disease appears mysteriously on the leaves of tiny prostrate willows almost as soon as they become established. *Fomes ignarius* was found fruiting on living *S. sitchensis*. *Exobasidium* on blueberry [*Vaccinium*] caused galls on 11%, 25%, and 38% of the leaves at 3 sites. A very early infection of blueberry rust (*Pucciniastrum vaccinii*) was seen on 10% of leaves in 1 area. *Fomes applanatus* [*Ganoderma applanatum*] was common and large, growing on hemlocks (*Tsuga* spp.) as old as 150 yr. Conks of both *G. applanatum* and *F. annosus* were present on spruce. Fungi such as *Ophiobolus graminis*, *Fusarium nivale* [*Calonectria nivalis*], *Pythium* spp., and a number of less serious ones are very destructive on grasses under conditions prevailing during the 1st 10–15 yr. after deglaciation.

The 2nd paper describes the raw ground rock first exposed by the glaciers as alkaline, sterile, and largely free from fungi. Early invaders are saprophytic and parasitic soil-invading filamentous forms which often prey on the N-starved pioneer plants of *Epilobium*, *Salix*, and *Populus* that also invade the new area. A few agarics occur in early sites, and a native discomycete, *Peziza alaskana*, closely follows the ice.

As the years pass, duff, agarics, and hypogaeous forms increase. Fungus activity is possibly somewhat greater in the original alder sequence than in the willow sequence. Bracket fungi become common but generally not for a century after the

ice has left. As the sites get older, moss and debris increase faster than fungi can destroy them, in spite of the great increase in forms. Soil once alkaline has long since become acid.

Dupias (G.). **Étude expérimentale d'Urédinées hétéroxènes. (Cinquième note.)** [An experimental study of heteroecious Uredineae. Note 5.]—*Bull. Soc. Hist. nat. Toulouse*, **93**, 1–2, pp. 225–240, 1958. [32 ref.]

In further experiments [**27**, 371; **28**, 569] 10 spp. were used. Aecidiospores from *Aquilegia vulgaris* var. *viscosa* in the E. Pyrenees gave uredosori and uredospores of *Puccinia agrostidis* on *Agrostis alba* and *A. vulgaris*, though all the other Gramineae tested remained unaffected. The rust is common in S.W. France and the Pyrenees in the telial state on *A. alba*; aecidia on *Aquilegia pyrenaica* and *A. vulgaris* are rare. Aecidiospores of *P. festucae* from *Lonicera periclymenum* infected *Festuca rubra*, with the formation of uredosori. A rust on iris was caused by a new sp., *P. urticaexiphioidis* Dupias with uredospores 25–33×21·5–27 (av. 27×24·5) μ: the aecidia were found on *Urtica dioica* and the uredospores and teleutospores on *I. xiphioides* near Luchon (Haute Garonne) at an alt. of 1,600 m. Aecidia of the type of *Aecidium euphorbiae* collected from *Euphorbia cyparissias* near Mont-Louis (E. Pyrenees, alt. 1,600 m.) on 12 June 1953 induced uredospore development (*Uromyces striatus*) only on lucerne.

Boedijn (K. B.). **The Uredinales of Indonesia.**—*Nova Hedwigia*, **1** (*1959*). 3–4, pp. 463–494, 2 pl. (7 fig.), 1960. [23 ref.]

This annotated list, which includes the author's identifications and all the spp. given in the literature, is a complete enumeration of the rusts (154 spp.) of Indonesia and their parasites. A new genus is described, *Diphragmium*, for *D. koordersii* (syn. *Diorchidium koordersii*) on the petioles, midribs, and leaves of *Derris* sp., *D. bantamensis*, *D. elliptica*, and *D. heterophylla* in Java. Mention may also be made of *Puccinia cannae* [map 224] on *Canna* and of *P. chrysanthemi* [map 117] on chrysanthemum, both in Java.

Cummins (G. B.). **Descriptions of tropical rusts.**—*Bull. Torrey bot. Cl.*, **87**. 1. pp. 31–45, 15 fig., 1960.

This paper from Dept Bot. Plant Path., Purdue Univ., Lafayette, Ind., includes 54 spp. of Uredinales, of which 38 are described as new, 12 are proposed as comb. nov., and supplementary notes are provided for 4. Included in the new spp. are *Puccinia oncidii* on *Oncidium* sp. intercepted from Mexico, and *Sphenospora saphena* in Florida on *O. tetrapetalum* thought to be imported from Jamaica.

Kern (F. D.) & Keener (P. D.). **Identity of a rust on Ephedra.** –*Science*, **131**, 3396, p. 298, 1960.

The authors (Pa State Univ., Univ. Park, and Univ. Ariz., Tucson) suggest that the rust on *Ephedra* spp., formerly referred to as *Peridermium*, more closely resembles *Roestelia* and the teleutospore state may be *Gymnosporangium multiporum* on *Juniperus* spp. Distribution of the 2 sets of hosts is similar; the 2 rust forms have the same geographic range and have been found in close proximity in Coconino county, Ariz.

Kudryavtsev (V. I.). Систематика Дрожжей. [The systematics of Yeasts.]—427 pp., 76 pl., 20 fig., Moscow, Academy of Sciences of the U.S.S.R., 1954. Roubles 25.50. [30 pp. ref.]

In the general section of this work [cf. **39**, 375] the 1st 4 chapt., dealing with the theoretical aspects of the systematics and classification of yeasts (pp. 9–106), are followed by one on microbial enzymes (pp. 107–114) and one on laboratory methods

used for identification (pp. 115–130), which contains essential information on the life cycle of yeasts (pp. 115–123) and an explanation of their ability to form N-free C-containing substances (pp. 123–129). The special section includes the classification of the Unicellomycetales into 3 families, viz. Saccharomycetaceae (genera *Saccharomyces*, *Issatchenkia* (gen. nov.), *Zygosaccharomyces*, *Fabospora*, *Zygofabospora*, *Pichia*, *Zygopichia*, *Hansenula*, *Zygowillia*, *Williopsis*, *Zygowilliopsis*, *Debaryomyces*, *Schwanniomyces*, *Metschnikowiella*, *Coccidiascus*, *Nadsoniomyces*, *Endoblastomyces*), Schizosaccharomycetaceae (*Schizosaccharomyces*, *Octosporomyces*), and Saccharomycodaceae (*Saccharomycodes*, *Saenkia*, *Hanseniaspora*, *Nadsonia*). There is a key to each of the larger groups. The work, which is the first of this kind in Russian, is based on the study of over 3,000 yeast cultures on both natural and artificial substrates. It is well produced, richly illustrated, with ample bibliography.

Verona (O.) & Montemartini (A.). **Sinossi dei lieviti descritti dal 1952 al 1958.** [A synopsis of the yeasts described from 1952 to 1958.]—*Atti Ist. bot. Pavia*, Ser. V, **17**, pp. 1–121, 1960.

This annotated list, intended to supplement and bring up to date the book by Lodder & Kreger-Van Rij [**31**, 567], presents as objectively as possible the characteristics of the new taxa from the papers in which they were published, together with some published keys. The genera, spp., and vars. are arranged alphabetically under the 2 main groups and indexed.

Booth (C.). **Studies of Pyrenomycetes : I. Four species of Chaetosphaeria, two with Catenularia conidia. II. Melanopsamma pomiformis and its Stachybotrys conidia. IV. Nectria (Part I). V. Nomenclature of some Fusaria in relation to their nectrioid perithecial states.** —*Mycol. Pap.* 68, 27 pp., 7 fig., 1957; 73, 115 pp., 2 pl., 35 fig., 1959; 74, 16 pp., 4 fig., 1959.

This series (Part III of which was published in *Trans. Brit. mycol. Soc.*, **41**, pp. 335–340, 1958) deals with the taxonomy of Pyrenomycetes with reference to their conidial states. Part IV includes references to all British records of *Nectria*. The species are arranged in 9 groups based on the structure of the perithecia and conidial morphology. Keys are given both to the groups and to the species.

In Part V *Hypomyces solani* (transferred as *Nectriopsis solani*) is stated to be distinct from *Fusarium solani*, the perithecial state of which is given as *Nectria haematococca*. *Calonectria rigidiuscula*, the perithecial state of *Fusarium decemcellulare*, is redescribed.

Hesseltine (C. W.). **Gilbertella gen. nov. (Mucorales).** *Bull. Torrey bot. Cl.*, **87**, 1, pp. 21–30, 1 pl. (9 fig.), 1 fig., 1960.

At Agric. Res. Service, U.S. Dept Agric., Peoria, Ill., *Choanephora persicaria*, not reported since 1925 [**5**, 234], was studied from the type material and from several isolates from soil, sewage, peaches, and mulberries. The zygospores showed that it represents a new genus, *Gilbertella*; it is heterothallic, with *Mucor*-like zygospores and *Choanephora*-like sporangia, being intermediate between the two. Zygospores were produced in liquid media and formed β-carotene. The fungus causes a brown, firm type of rot in peaches with abundant sporulation over the surface.

Robinson (R. A.). **Notes on Kenya agriculture. VIII. Important plant diseases.**—*E. Afr. agric. J.*, **25**, 3, pp. 131–146, 1960.

A table listing 263 of the most important plant diseases found in Kenya is presented in alphabetical order of the English name of the host (followed by the Latin name) and then the name of the disease (English and scientific), the diagnostic symptoms, case of diagnosis (4 categories) and control methods, numbered in accordance with an introductory section briefly describing 31 control practices.

Hayes (W.) & Clowes (R. C.) (Editors). **Microbial genetics.**—x+300 pp., illus., Cambridge University Press, 1960. 42*s*.

The 14 papers by 16 authors which make up this volume were presented at the 10th Symposium of the Soc. gen. Microbiol., London, Apr. 1960. While the scope of the papers is diverse and mainly bacterial, one, by R. H. Pritchard, deals with the bearing of recombination analysis at high resolution on genetic fine structure in *Aspergillus nidulans* and the mechanism of recombination in higher organisms, and another, by A. Gierer, with ribonucleic acid as genetic material of viruses, with special reference to tobacco mosaic virus.

Moreau (F.). **Revue de cytologie : les progrès récents de la cytologie des champignons en microscopie usuelle et en microscopie corpusculaire.** [Review of cytology: recent advances in the cytology of fungi by the usual and by corpuscular microscopy.]—*Bull. Soc. bot. Fr.*, **105** (*1958*), 7–8, pp. 363–429, 1 pl., 1959. [Ref. pp. 414–429.]

After reviewing the technical advances made in microscopy in recent years the author describes the results obtained by numerous workers on the cytology of the Plasmodiophoraceae, the karyology of the yeasts, the yeasts with affinities towards the basidiomycetes, the fungal nucleus, the paranuclear body of the Opisthomastigomycetes, the 'nebenkern' of the basidiomycetes, the polar caps of *Plasmodiophora* and the ascomycetes, the question of the centrosome, the apical apparatus of the ascus, the origin of spore ornamentation in the discomycetes, the spores of the Saprolegniales and the locomotor apparatus of the Mastigomycetes, and the 'ultra-structure' of fungi as revealed by the electron microscope.

Chevaugeon (J.) & Lefort (Christiane). **Sur l'apparition régulière d'un 'mutant' infectant chez un champignon du genre Pestalozzia.** [On the regular appearance of an infective 'mutant' in a fungus of the genus *P.*]—*C. R. Acad. Sci., Paris*, **250**, 12, pp. 2247–2249, 2 diag., 1960.

Wild and mutant strs. (the latter obtained by X-ray irradiation) of *P*[*estalotia*] aff. *annulata*, isolated from a young stem of quinine [*Cinchona*] in the Guinea Republic, gave rise with a high degree of frequency to an identical sectional variant which was shown experimentally to be infective. It was marked by an arrest of mycelial growth, all the hyphae being repent or immersed, with a yellow pigmentation imparting a reddish tinge to the sector, and it finally enveloped a large part of the parent culture.

Tatum (E. L.). **A case history in biological research.**

Beadle (G. W.). **Genes and chemical reactions in Neurospora.**—*Science*, **129**, 3365, pp. 1711–1715 [35 ref.]; 1715–1719 [21 ref.], 1959.

Lederberg (J.). **A view of genetics.**—*Ibid.*, **131**, 3396, pp. 269–276, 2 fig., 1960. [88 ref.].

These 3 informative reviews are based on lectures by Nobel prize winners of 1958. In the 1st 2 the historical background to the studies on *Neurospora* is sketched by the authors who discovered that genes act by regulating chemical events. The 3rd deals primarily with the role of deoxyribonucleic acid in microbial genetics.

Prakken (R.). **Induced mutation.**—*Euphytica*, **8**, 3, pp. 270–322, 1 fig., 1959. [Dutch summ. 789 ref.]

A survey is given of the methods used and the results obtained in research on induced mutation. The theoretical aspects and the practical application (mutation breeding) are fully discussed.

Kiss (A.). **Observations concerning the correlation of disease resistance and polyploidy.**—*Acta agron. hung.*, **7**, 4, pp. 379–385, 1958. [Germ., Russ. summ. 14 ref.]

The results of experiments at the Agric. Res. Inst., Hungarian Acad. Sci., Martonvasar, demonstrated an approx. equal degree of susceptibility to mildew (*Erysiphe* [*graminis*]), stem rust (*P*[*uccinia*] *graminis*), and leaf rust [*P. recondita*] in the tetraploid and diploid forms of rye vars. Magyaróvár and Kisvárda. Resistance to all 3 pathogens in amphidiploid plants of the F_1 hybrids of *Triticum timopheevi* × wheat (*T. durum*) denoted the stabilization of the resistance of the former parent in the polyploid offspring. This character was shown to be transmissible by means of appropriate selection to summer wheat and *T. timopheevi* hemialloploids. Even when both parents are susceptible to the 3 fungi the F_1 hybrids of wheat and rye have proved largely resistant. The resistance of *T. turgidum* amphidiploids with 42 chromosomes, of summer wheat with 56, and of Magyaróvári rye affords a possibility of stabilizing the F_1 resistance in the amphidiploid progeny.

Progeny of the artificial tetraploids developed from the local Gyulai lucerne, very slightly susceptible to *E.* [*polygoni*] and rust (*Uromyces striatus*) [cf. **37**, 297], and from the improved strains B010 and 091–18, sustained heavy damage from both diseases, indicating an enhancement of the original tendency.

In 1953 A. Rajháthy (verbal communication) produced a strain of *Antirrhinum majus* resistant to rust [*P. antirrhini*: **37**, 285] by colchicine treatment without obtaining tetraploid offspring.

It is concluded from these admittedly limited observations that both artificial polyploidy and colchicine treatment are very important factors in the plant-breeding programme.

Prota (U.). **Un semplice metodo per prelevare, mediante nastri adesivi, fruttificazioni di funghi fitopatogeni dagli organi solpiti.** [A simple method for taking, by means of adhesive tape, fructifications of phytopathogenic fungi from infected organs.]—*Studi sassaresi*, Sez. III, **5** (*1957*), pp. 113–117, 1 pl., 1959.

To facilitate a study at Univ. Sassari, Sardinia, of the conidial development of fungi on attached leaves a piece of transparent, adhesive tape was pressed over the whole upper surface and then stuck on a glass slide for examination. The leaves are then wiped with wet cotton wool and dried, so that they can be re-examined later as fructification continues.

Fennell (Dorothy I.). **Conservation of fungous cultures.**—*Bot. Rev.*, **26**, 1, pp. 79–141, 1960. [336 ref.]

This is a very useful critical summary of methods, which are classified under the general headings of periodic transfer, oil-covered slants, soil or sand cultures, drying, freezing, and freeze-drying; the directions for application and the applicability of each method are discussed.

Sukhov (K. S.). Проблемы общей и сельскохозяйственной вирусологии. [Problems of general and agricultural virology.]—Защ. Раст., Москва [*Zashch. Rast., Moskva*], **5**, 1, pp. 18–22, 1960.

The subjects reviewed are the nature of viruses, various aspects of control including the effect of the ecological background, selection for resistance, transmission, vectors, and heat disinfection of the soil.

Vlasov (Y. I.). Новые данные о вирусных болезнях растений в Средней Азии. [New data on virus diseases of plants in Central Asia.]—Защ. Раст., Москва [*Zashch. Rast., Moskva*], **5**, 1, pp. 22–23, 1960.

Lucerne mosaic virus, detected in Uzbekistan and Tadzhikistan, proved non-transmissible by sap inoculation from lucerne to lucerne. A virus causing mosaic

on cowpea [cf. **26**, 524] was sap transmissible and also up to 5% seed transmissible. An exceptionally virulent disease of tomatoes in the open characterized by the dying of the fruit and tops occurred in the Tashkent region in 1958. Tobacco mosaic virus was present [cf. **38**, 338] but potato virus X was absent. As symptoms were unusual for streak, other viruses may be involved.

Reyes (G. M.), Martinez (A. L.), & Chinte (Priscilla T.). **Three virus diseases of plants new to the Philippines.** *F.A.O. Pl. Prot. Bull.*, **7**, 11, pp. 141–143, 2 fig., 1959.

Studies at the Bureau of Plant Industry, Manila, showed that Golden Harvest, a filler-type Virginia tobacco, is very susceptible to tobacco leaf curl virus disease [cf. **38**, 36]. [What was believed to be] cotton leaf curl virus disease [map 25] appeared suddenly on some experimental cotton plants [but see below]. A similar condition, characterized by dwarfing, upward curling, and distortion of the leaves, and tapering of the stem apex, was also noted on papaw in an orchard in Diliman, Rizal, in 1956.

Nour (M. A.). **On 'leaf curl' of Cotton in the Philippines.**—*F.A.O. Pl. Prot. Bull.*, **8**, 5, pp. 55–56, 2 fig., 1960.

It is suggested from Univ. Khartoum, Shambat, that the symptoms on cotton in the Philippines recently attributed to cotton leaf curl virus [see above] are more probably due to herbicidal injury. Similar symptoms caused by derivatives of 2,4-D have often been observed in the Republic of Sudan, and such damage has been reported elsewhere [cf. **28**, 64].

Yoshii (H.). **Plant virus transmission by insects. V. The abnormal metabolism of virus-transmitting Nephotettix bipunctatus cincticeps infected with Rice-stunt virus.**—*Virus* (*Osaka*), **9**, pp. 415–422, 1959. [*Chem. Abstr.*, **54**, 5, col. 4784b, 1960.]

In further studies [cf. **38**, 741] O consumption, respiratory quotient, and oxidative phosphorylation were higher in infected than in uninfected insects. The virus [rice dwarf] slightly increased phosphatase activity and caused a remarkable rise in total phosphate, especially that in nucleic acid. The UV absorption max. of nucleic acid occurred at 260 mμ in uninfected and at 255 mμ in infected leafhoppers. The nucleoproteins separated into 3 fractions on paper electrophoresis, of which the 1st 2 declined when the vector became infected.

Yarwood (C. E.). **Release and preservation of virus by roots.**—*Phytopathology*, **50**, 2, pp. 111–114, 1960. [25 ref.]

Further studies at Univ. Calif., Berkeley [cf. **38**, 469, 733], explored Frazier's observation of the apparent infection of strawberry roots by tobacco necrosis virus (TNV) which contaminated greenhouse bench tops when irrigation water escaped through pot drainage holes [**35**, 29]. Drainage water from *Cleome spinosa* infected by TNV [**39**, 43], from tobacco with tobacco mosaic virus (TMV), and from bean [*Phaseolus vulgaris*] with TMV bean str. when inoculated on to leaves of cowpea, bean, and cowpea, respectively, induced lesions typical of each virus. Thus the occasional spread of TNV in the greenhouse appears to be accounted for. Comparable tests for cucumber mosaic virus in drainage water from infected tobacco, peach yellow bud mosaic virus from bean or cowpea, and peach ring spot virus from bean did not induce infection.

Suspensions of TNV and TMV in which healthy Cleome or tobacco roots had stood for several hr. were more infective than the controls without roots. Exudations from the roots apparently prolonged the life of the virus but did not increase its infectivity. There was no evidence that either virus moved into healthy roots.

Schlegel (D. E.). **Transmission of several plant viruses by phenol-water extracts of diseased tissues.** —*Phytopathology*, **50**, 2, pp. 156–158, 1960.

At Univ. Calif., Berkeley, lucerne mosaic, tobacco mosaic, potato X, tobacco ring spot, tobacco necrosis, cucumber mosaic, and pea enation mosaic viruses were transmitted to various hosts when phenol-water extracts of diseased tissues were used as inoculum with carborundum. Preparations of the 1st 4 were much less infective than comparable amounts of whole virus (tissue ground in 1% K_2HPO_4); those of pea enation mosaic were more infective in 2 of 3 experiments; with the other 2 infectivity was about the same. Apple mosaic, aster yellows, [beet] curly top, and strawberry mottle viruses were not transmitted in phenol-water extracts. The extracts were made by homogenizing the plant tissue with 4 or more times its wt. of 1:1 water-saturated phenol:1% tetrasodium pyrophosphate for about 5 min. at 5° C., then centrifuging for 5 min. at 6,000 rev. min. Further purification was found to be unnecessary.

Breese (S. S.) & Trautman (R.). **Examination of spray-droplet particle counting as a measure of virus concentration.** —*Virology*, **10**, 1, pp. 57–72, 2 fig., 4 graphs, 1960.

In studies at the Plum Island Animal Disease Lab., Greenport, Long Island, N.Y., the modified nasal nebulizer described by Williams (*Exp. Cell. Res.*, **4**, pp. 188–201, 1953) was used to spray a mixture of southern bean mosaic virus and polystyrene latex particles of known diam. (88, 188, and 264 mμ) on to parlodion-coated copper mesh grids. The preparations obtained were studied to examine the applicability of the spray-droplet method for determining particle concentration. Neither the binomial nor the Poisson distributions are applicable to the counts of particles in individual droplet residues, but both are useful for mathematical deductions as to counting errors in the totality of data. A chart is given from which, when determining the conc. of such particles as viruses, the level of expected error may be determined. This is given in terms of total number of particles counted and the ratio of the number of unknown to the number of known particles.

Yamaguchi (A.). **Increased respiration of leaves bearing necrotic local virus lesions.** —*Virology*, **10**, 3, pp. 287–293, 1960.

At Nagoya Univ., Anjo, Aichi-ken, Japan [cf. **39**, 41], the half-leaf method was replaced in some tests by another in which opposite leaves or leaflets, one inoculated and one not, were compared: disks were floated on distilled water in flasks and the O uptake was measured by use of the Warburg respirometer. Respiration was increased in *Datura stramonium*, broad bean, and *Gomphrena globosa* infected by the viruses of tobacco mosaic, cucumber mosaic, and potato X, respectively. While the increase varied from one virus-host combination to another and with the stage of lesion development, in all combinations the ratio of the respiration rates of infected: healthy leaves was higher 3 days after inoculation than at any subsequent time. After the lesions had aged and their central areas had dried out the respiration rate remained high in the infected leaves, suggesting drastic physiological disturbance in the peripheral tissue of the lesions. The increase may be explained partly by assuming that the materials accumulating round the necrotic lesions are substances involved in respiration.

Schade (Christiane). **Untersuchungen zur serologischen Verwandtschaft des Rhababermosaikvirus mit dem Gelbverzwergungsvirus der Himbeere (Raspberry yellow dwarf virus).** [Studies on the serological relationship between Rhubarb mosaic virus and Raspberry yellow dwarf virus.] —*Phytopath. Z.*, **37**, 4, pp. 422–424, 1 fig., 1960.

At the Phytopath. Inst., Martin Luther Univ., Halle-Wittenberg, an isolate of the

former virus, identified by Klinkowski & Opel [**37**, 64], and 1 of the latter from Harrison [**37**, 669], recently shown by Cadman [**39**, 261] to be a str. of Arabis mosaic virus, were found to be closely related serologically. Both formed similar amorphous inclusion bodies in the epidermal cells of *Petunia hybrida*.

VALENTA (V.). **Interference studies with yellows-type plant viruses. II. Cross protection tests with European and American viruses.**—*Acta virol.*, **3**, 3, pp. 145–152, 1959.

Cross-protection testing at Inst. Virology, Czechoslovak Acad. Sci., Bratislava, has been continued, using the same viruses and strs. as before [**38**, 680] together with 2 Canadian isolates of potato witches' broom virus. There was cross protection between the German str. and the Canadian strs. In the other combinations tested, challenge inoculations resulted either in dual infection or, more often, in the suppression of 1 virus by another. There seems to be a 'gradient of mutual reaction' between the yellows viruses tested, indicated by the presence or absence of cross protection and the degree of suppression of one yellows virus by another.

THROWER (L. B.). **Observations on the diseases of Cacao pods in Papua–New Guinea.—I. Fungi associated with mature pods.—II. Cherelle wilt.**—*Trop. Agriculture, Trin.*, **37**, 2, pp. 111–120, 1 graph; 121–124, 1960.

Black pod of cacao in the Gazelle Peninsula, New Britain, is considered by the Dept Agric. to consist of a wet-weather component (*Phytophthora* pod rot) caused by *P. palmivora* [**35**, 359] and a dry-weather component (*Diplodia* pod rot) caused by *Botryodiplodia theobromae* [cf. **38**, 658] and *Colletotrichum* sp. [cf. **32**, 303]. Tissues invaded by *P. palmivora* were light brown on fresh cuts, not drier than healthy tissues, and the walls of the pods remained firm and the mucilage pale. The str. isolated from cacao was highly specific to that crop. Though 46% of infection occurred at the proximal end of the pod it is questionable whether it had originated in the diseased cushions, especially as these were highly resistant to the str. common on the pods. A marked difference in resistance was noticed between pods from different trees. Heaps of broken pods left on the ground were a potent source of inoculum even after 9 months, though surface sporangia disappeared from them much more quickly than from pods on trees. However, contrary to findings elsewhere [cf. **34**, 353], soil was not found to serve as a vehicle of inoculum and the fungus could not be detected in pod-free soil. Frequent removal of affected pods is recommended for control.

Rots by *B. theobromae* were characterized by dark brown colour, tissues drier than the healthy ones, a tendency of the pod walls to disintegrate, mucilage darker than normal, and a musty odour on cutting the pod. The conidia are believed to rest on the pod surface and in the depression at the base of the pedicel and to attack only if the resistance of the pods has been diminished. The onset of rotting was observed only after the pod had become slightly flaccid.

In paper II 75% of the cherelle wilt [cf. **38**, 358] studied is ascribed to physiological wilting, characterized by discoloration which started at one end and soon involved the whole cherelle. It chiefly affects cherelles less than 2 cm. long and seems to result from the decline of water balance and subsequent loss of turgor. The remaining 25% was caused by *P. palmivora* infection, closely resembling *P.* pod rot of mature pods, which began at one or two places on the surface and developed into lesions sharply divided from healthy tissue.

HENAO (C. R.). **Represión de los insectos taladradores del tronco de Cacao (Theobroma cacao L.).** [Control of borer insects in the trunk of Cacao.]—*Acta agron. Palmira*, **8**, 4, pp. 167–180, 1958. [Engl. summ. Received Dec. 1959.]

A study at Puerto Tejada and Palmira Exp. Sta., Colombia, of the association

between *Ophiostoma* [*Ceratocystis*] *fimbriata* [**39**, 15, 401] on cacao trees and insects of the family Scolytidae showed that 2 applications of 0·25% BHC, 0·25% aldrin, 0·25% dieldrin, 1% toxaphene, or 1% DDT (in this order of effectiveness) at an interval of 1 month prevented insect infestation of the bark.

Malaguti (G.). **Primeras observaciones sobre la 'buba' o 'agallas' del Cacao en Venezuela.** [First observations on 'tumour' or 'galls' of Cacao in Venezuela.]—*Agron. trop., Maracay*, **8**, 3, pp. 115–120, 13 fig., 1958. [Received Apr. 1960.]

In this note from the Cent. Invest. Agron., Maracay, cushion galls in Venezuela are stated to resemble those described from neighbouring countries [cf. **39**, 223]. They are, however, not confined to the floral cushions, but are fairly common on 4–5-yr.-old plants raised from seed and 2–4-yr.-old plants from grafted material. In the latter it is common to find branches on which every floral cushion is severely hypertrophied. In certain early-flowering selections, e.g. Ocumare 24, galls are seen on 8–12-month plants still in pots. The occurrence of well developed galls on 3-month seedlings of crosses, e.g. Ocumare 61×Costa Rica 677 and Ocumare 73×Costa Rica 67, suggests a genetical aetiology.

Miyamoto (Y.). **Studies on soil-borne cereal mosaics. VI. Further studies on the nature of soil transmission in soil-borne cereal mosaic viruses.**—*Ann. phytopath. Soc. Japan*, **24**, 4, pp. 207–212, 1959. [Jap. summ. 24 ref.]

Further details of information already noticed [**39**, 290 *et passim*].

Nakagawa (M. O.), Soga (Y.), Watanabe (S.), Goch (H.), & Nishio (K.). **Genetical studies on the Wheat mosaic virus. 2. Genes affecting the inheritance of susceptibility to strains of yellow mosaic virus in the varietal crosses of Wheat.**—*Jap. J. Breeding*, **9**, 2–3, pp. 118–120, 1959. [Jap. with Engl. summ. *Biol. Abstr.*, **35**, 7, p. 1550, 1960.]

Genes H and M govern infection by wheat yellow mosaic virus [soil-borne wheat mosaic virus (str.); cf. **38**, 501] while A is considered to modify the action of H.

Annual Report of the Plant Breeding Institute, Cambridge, 1958/59. —viii+69 pp., 1960. 5*s*.

There are numerous references to disease resistance and the production of resistant vars. of various crops in the sections on cereal, potatoes, brassicas, sugar beet, forage crops, and grasses.

The work of the pathology section (pp. 60–63) [cf. **38**, 77] under R. C. F. Maceer has included the production of hybrid material of wheat and barley for investigations into the inheritance of resistance. The new compartmented glasshouse, spore-proof and air-conditioned, was in use for short periods. Natural infection of wheat by race 8 B [**37**, 633, 653] of yellow rust (*Puccinia glumarum*) [*P. striiformis*: cf. **38**, 590] appeared in the plots on 1st Apr. 1959, but developed very slowly. *P. graminis* race 21 was found late in July; race 17 was more frequent than previously; and 2 isolates were identified as race 34 and 1 as race 81, the latter not recorded before in the United Kingdom. At Seale Hayne, Devon, some selections of spring barley developed severe symptoms of leaf blotch (*Rhynchosporium secalis*) [cf. **37**, 655].

Further work confirmed that uredospores of *P. striiformis* can be stored under reduced pressure at 0·006 mm. Hg after drying at this pressure for 6 hr. with P_2O_5 as a desiccant, a technique now adopted as the standard storage method for cereal rusts. Three races found recently in the U.K. were provisionally identified as 2 B, 5, and 8 B, but specialization probably occurs within these races. Resistance of hybrids from the resistant wheat Hybrid 46×Holdfast and Yeoman (both susceptible) was very promising.

When the effect of eyespot (*Cercosporella herpotrichoides*) was assessed as (1) percentage of ear-bearing stems with severe infection and structural weakening, (2) lodging, and (3) loss in av. yield between inoculated and uninoculated plots, a direct relationship was established between (1) and (3).

A high percentage of embryo infection by loose smut (*Ustilago nuda*) [**39**, 21] was secured in many barley vars. by hypodermic needle inoculation of flowers at anthesis. Only USDA 235 developed no infection in the embryo or the ear. Percentage infection after inoculation of each flower was consistently high in vars. such as Maythorpe, Proctor, and Spratt-Archer, often reaching 100%; in Freja, Herta, and Rika it seldom exceeded 60%. This conflicts with the field performance of these vars., infection being only occasional in the former group, though commonly severe in Herta and Rika. In general, barley vars. of British origin are closed-flowering and those bred in Scandinavia open-flowering. In the vars. tested it was established that the degree of loose smut infection was related to type of flowering, incidence being low in some British vars. because of a disease-escape mechanism.

In breeding against cereal diseases the most advanced material, from a complex cross involving C.I.12633, Chinese 166, and Cappelle Desprez wheat, produced promising segregates of good agronomic type with resistance to yellow rust and powdery mildew (*Erysiphe graminis*). These are undergoing further selection for resistance to other diseases.

Björkman (I.). **1958 års rostinventering.** [Rust catalogue for 1958.]—*Växtskydds-notiser, Stockh.*, **23**, 15, pp. 74–76, 1 fig., 1959.

This information has already been noticed [**39**, 292].

Dale (J. L.) & Templeton (G. E.). **Downy mildew of small grains and grasses in Arkansas.**—*Plant Dis. Reptr*, **44**, 3, pp. 206–207, 3 fig., 1960.

The 1st record in the State by Univ. Ark., Fayetteville, of *Sclerophthora* [*Sclerospora*] *macrospora* [**38**, 136] on fescue (*Festuca arundinacea*), goosegrass (*Eleusine indica*), oats, barley, wheat, and rye, the last being a new host record for U.S.A.

Sinha (R. C.). **Comparison of the ability of nymph and adult Delphacodes pellucida Fabricius to transmit European Wheat striate mosaic virus.**—*Virology*, **10**, 3, pp. 344–352, 1 fig., 1960.

In further work at Rothamsted exp. Sta. [cf. **38**, 683] the ability of *D. pellucida* to transmit the virus to offspring and to plants was found to depend on the age at which the virus was acquired from plants. Only those insects which had acquired the virus when nymphs produced infective progeny and non-viable eggs. There may be a critical stage in the development of the ovaries at which the virus must be established if it is to be passed on to the progeny.

Anaesthetized adults were rendered infective by puncturing the anterior of the abdomen immediately before or after an acquisition feed. Puncturing 1 week after acquisition, or of the thorax at any time, did not render them infective. Evidently the virus must pass through the gut wall if the insect is to become infective, and the permeability of the gut to the virus presumably decreases as the insect grows older.

Silverman (W.). **The development of stem rust on Wheat leaves treated with some sugars and sugar alcohols.**—*Phytopathology*, **50**, 2, pp. 114–119, 1 fig., 1960. [16 ref.]

In further studies at Univ. Minn., St. Paul [cf. **39**, 403], leaves of Little Club wheat, inoculated with race 15 B of *Puccinia graminis*, were detached when flecking occurred, washed, and held in the dark at 15° C. for a week in the test solutions, in water, or in standard solutions of 0·3 M sucrose or mannose. Only glucose and fructose and the oligosaccharides composed of similar moieties could support good

growth and sporulation. The sugar alcohols, particularly sorbitol and to a lesser extent mannitol, induced pustule blackening, the mycelium resuming normal sporulation on transfer to a favourable sugar. Sorbitol had a similar effect when sprayed on to attached infected leaves. Germination of uredospores from intermediate to large uredia in various sugars was 50%, but was generally less in those from smaller uredia. Blackened uredia were abnormal and the developing spores discoloured, misshapen, and non-viable.

Samborski (D. J.), Person (C.), & Forsyth (F. R.). **Differential effects of maleic hydrazide on the growth of leaf and stem rusts of Wheat.** —*Canad. J. Bot.*, **38**, 1, pp. 1–7, 1960. [17 ref.]

In further studies at Canada Dept Agric. Res. Sta., Winnipeg, Man. [cf. **38**, 194], maleic hydrazide solution was supplied to intact rust-infected wheat plants through the roots, to detached leaves floated on it, and to rust spores germinated on agar incorporating it. Applied through the roots at 10 and 100 mg./day, starting 7 days before inoculation, it caused marked inhibition of growth. It had no effect on the normal susceptibility of Little Club wheat to stem rust [*Puccinia graminis*], but induced susceptibility in the normally resistant Khapli, a shorter pre-inoculation interval being necessary with increasing conc. Both Little Club and Khapli became resistant to leaf rust [*P. recondita*] with pre-inoculation treatments of 100 mg./day, but at lower concs. susceptibility was increased. Results were similar with detached leaves. Different races of *P. recondita*, 10 in all, inoculated on the leaves varied in their reaction to maleic hydrazide, but inconsistently, for reasons unknown. The spores of 2 races of leaf rust (1 and 11) differed in their response, but both were more sensitive than stem rust (race 15 B). Apparently both nutritional and inhibitory factors are involved in resistance and specificity.

Forsyth (F. R.) & Peterson (B.). **Control of leaf and stem rust of Wheat by zineb and inorganic nickel salts.**—*Plant Dis. Reptr*, **44**, 3, pp. 208–211, 1960.

In further tests [cf. **38**, 589] by Dept Agric. Res. Lab., Winnipeg, Man., against leaf rust (*Puccinia recondita*) and stem rust (*P. graminis*) on Thatcher, Marquis, and Red Bobs, the best results were obtained with 6 applications of zineb 65% W.P. at $2\frac{1}{2}$ lb. acre, but Ni salts, particularly the sulphate at 1–$1\frac{1}{2}$ lb./acre at weekly intervals, were also effective, as were combinations of zineb and Ni salts (nickel sulphate–zineb at 1–$1\frac{1}{2}$; and nickel chloride–zineb at 1+1, 1+$1\frac{1}{2}$, or $1\frac{1}{2}$+$1\frac{1}{2}$ lb./acre).

Kostić (B.). **Napad mrko-crvene rdje (Puccinia triticina Erikss.) i crne rdje (Puccinia graminis Pers.) na nekim našim i italijanskim sortama Pšenice na teritoriji uže Srbije tokom 1958 godine.** [Brown rust (*P. recondita*) and stem rust (*P. graminis*) infection of some indigenous and Italian Wheat vars. in Serbia during 1958.] *Poljopr. Vojvod.*, **6**, 12, pp. 844–852, 1958. [Abs. in *Referat. Zh. Biol., 1960*, 3, p. 181, 1960.]

P. graminis [**39**, 404] and *P. recondita* [cf. **36**, 391] are present in 7 regions of Serbia, Yugoslavia. Infection was not especially severe in 1958. Wheat is somewhat more heavily infected by *P. recondita* than by *P. graminis*, which the author attributes to biological characters of the fungus. Susceptibility of Italian wheat vars. to *P. recondita* is not higher than in Italy. On indigenous wheat vars. infection by *P. recondita* was medium and by *P. graminis* weak.

Simon & Croisier. **Apparition d'une nouvelle race de charbon du Blé en France.** [The appearance of a new race of Wheat smut in France.]—*C. R. Acad. Agric. Fr.*, **45**, 16, pp. 790–792, 1959.

This new race of *Ustilago tritici* [*U. nuda*], referred to as the 'Cappelle' race,

attacks Cappelle Desprez, Heurtebise Blondeau, Marne Desprez, and Alsace 22, resistant to race 'Vilmorin 27'. Blé des Dômes, Maître Pierre, and Vilmorin 27, more or less susceptible to 'Vilmorin 27', are also susceptible to the new race. Hybride de Bersée, resistant to 'Vilmorin 27', and susceptible to the other race, '18–102', found in France, is resistant.

Ikäheimo (Katri). **Ophiobolus graminis Sacc. todettu maassamme kevätvehnässä.** [The determination of *O. graminis* on spring Wheat in a rural district.] - *Maataloust. Aikakausk.*, **31**, pp. 180–183, 2 fig., 1959. [Engl. summ.]

Of 280 samples with shrivelled heads collected in the autumn of 1958 from Uusimaa, S. Finland [cf. **33**, 664], 66 yielded *O. graminis* [map 334], also present in 7 of 50 lodged plants and 2 of 50 without specific symptoms. The inoculation of young wheat plants with the fungus resulted in the development of take-all.

Pirson (H.). **Prüfung verschiedener Winterweizensorten auf Anfälligkeit gegen Septoria nodorum Berk. mit Hilfe von künstlichen Infektionen.** [Testing of different winter Wheat varieties for susceptibility to *S. nodorum* using artificial infections.]—*Phytopath. Z.*, **37**, 4, pp. 330–342, 4 graphs, 1960. [Engl. summ.]

At the Inst. für Getreide-, Ölfrucht- und Futterpflanzenkrankheiten, Kiel-Kitzeberg, Germany, winter wheat plots sprayed with a spore suspension of *S. nodorum* [**37**, 32] developed uniform infection. Both the number of spores formed and the 1,000 grain wt. were used in estimating var. reaction. The time of infection is of decisive importance in relation to intensity of attack. Early attack damages the grain wt. much more than late and causes the same degree of damage in all vars. From the milk stage onwards there is usually little damage. In older organs the mycelium grows less and soon forms pycnidia. Early maturing vars. are in general less damaged than late; Carsten V proved specifically less susceptible. Excessive N manuring delays the host development and so increases the probability of infection.

Schieber (E.) & Fumagalli (A.). **'Fusarial head blight', serious disease of Wheat in Guatemala.**—*Plant Dis. Reptr*, **44**, 3, p. 220, 1960.

A severe *Gibberella* and *Fusarium* head blight attack [cf. **30**, 265] of vars. Lerma Rojo and Guateian 2809 grown at approx. 4,000 ft. is reported from the Institute Agropecuario Nacional, Guatemala. The pathogen was identified as *Fusarium roseum* [*Gibberella rosea*] f. *cerealis* [cf. **38**, 78].

Nitzany (F. E.) & Kenneth (R.). **The identification of Barley stripe mosaic virus in Israel.**—*F.A.O. Pl. Prot. Bull.*, **8**, 3, pp. 31–32, 1959.

It is reported from Rehovot that in the spring of 1957 barley plants of different vars. in various parts of Israel developed symptoms of barley stripe mosaic virus [cf. **39**, 21]. The virus was shown to be seed-borne in 2 vars. (Tunisith and B.M.C.). Of 2 oat vars. tested, Saia was readily infected, whereas Mulga was not.

Singh (G. P.), Arny (D. C.), & Pound (G. S.). **Studies on the stripe mosaic of Barley, including effects of temperature and age of host on disease development and seed infection.**—*Phytopathology*, **50**, 4, pp. 290–296, 1 fig., 1 graph, 1960. [22 ref.]

In further studies at Univ. Wis., Madison [cf. **38**, 248; **39**, 21], plants of 34 gen. from 12 families were mechanically inoculated with barley stripe mosaic virus. Seven gramineous spp. were readily infected and the virus recovered from them, but not from 3 other grasses nor from 3 non-gramineous hosts, on all of which chlorotic or necrotic lesions were produced. Similar lesions on *Chenopodium album* were reproducible by sub-inoculation to this host, but not to barley, apparently because of an

inhibitory substance. The other hosts used proved immune, including rice, tobacco, and sorghum, which have been reported susceptible by other workers, who possibly used different strs. of the virus.

In the greenhouse in winter, when light was often below opt., disease severity in susceptible wheat, barley, and maize increased with rising soil and air temps. Maize was rather less susceptible and initial symptom development was max. at 28° C., though it eventually became as pronounced as at lower temps. The effect of soil temps. was less marked, wheat appearing to be the most susceptible to these, symptoms being more marked at 28° and 24° than at 20° and 16°.

Symptom expression in tolerant barleys became more marked at higher temps., being almost absent at 16° but marked at 24° and 28°. Such vars. proved susceptible at all stages, but symptoms were most marked when infection occurred before the boot-leaf stage; Oderbrucker was equally susceptible at all growth stages. Tolerant vars. gave less than 15% seed transmission in the field, compared with 75% in Oderbrucker; max. seed transmission occurred at 20° and 24°.

Orlob (G. B.) & Arny (D. C.). **Transmission of Barley yellow dwarf virus by different forms of the apple grain aphid, Rhopalosiphum fitchii (Sand.).**—*Virology*, **10**, 2, pp. 273–274, 1960.

To determine (at Dept Plant Path., Univ. Wis., Madison) whether the forms of *R. fitchii* which colonize the winter hosts, hawthorn (*Crataegus*) and apple, immune from barley yellow dwarf virus, are capable of transmitting the virus, aphids were collected from hawthorn in autumn 1958. All the autumnal forms showed some ability to adapt to barley, though mortality was usually above 50%. They moulted and oviposited, but dispersed quickly when the cages were removed. Only the oviparae transmitted the virus. Autumnal forms of the non-vector *Aphis pomi* adapted themselves somewhat to barley, but did not transmit the virus. Beginning in early Apr., fundatrices and fundatrigenia of *R. fitchii* from apple and hawthorn spp. were tested in the same manner. The adaptation of these spring forms was less successful. The fundatrices would not feed and soon died, and the adaptation of alatoid fundatrigeniae in the early nymph stages was 'equally poor', but the later stages fed for longer periods and transmitted the virus, though irregularly. Alate fundatrigeniae collected from apple sp. after moulting were restless, but did some feeding and produced young; they did not transmit the virus.

It is concluded that vector specificity is genetically determined.

Banttari (E. E.) & More (M. B.). **Transmission of the Aster yellows virus to Barley.**—*Plant Dis. Reptr*, **44**, 3, p. 154, 1 fig., 1960.

Further investigations at Minn. agric. Exp. Sta. showed that the 'leaf roll dwarf' symptom of barley leaves reported to be independent of oat blue dwarf virus [**39**, 165, 173] is caused by aster yellows virus, transmitted from asters and flax by the leafhopper *Macrosteles fascifrons* [cf. **38**, 501].

Ludwig (R. A.), Spencer (E. Y.), & Unwin (C. H.). **An antifungal factor from Barley of possible significance in disease resistance.** *Canad. J. Bot.*, **38**, 1, pp. 21–29, 2 pl., 2 graphs, 1960. [13 ref.]

Further studies at the Pesticide Res. Inst., Canada Dept Agric., Ont. [cf. **37**, 157], demonstrated that the susceptibility of barley coleoptiles to *Helminthosporium sativum* [*Cochliobolus sativus*] is associated with tissue senescence. Aqueous extracts of young coleoptiles showed high antifungal activity which disappeared rapidly between the 5th and 6th days owing to the appearance of an inhibitor. The non-specific antifungal factor is distinct from benzoxazolinones and the empirical formula of $C_9H_{17}O_7N$ is suggested for it. The inhibitors were divalent cations, particularly Ca, which neutralize the antifungal factor, and may only reach the site

of infection following a change in permeability permitting their diffusion through the cells.

Browning (J. A.), Peters (D. C.), & Frey (K. J.). **Virus+aphids+Oats = yellow dwarf of Oats.**—*Iowa Fm Sci.*, **14**, 9, pp. 6 (462) 8 (464), 6 fig., 1 map, 1960.

A popular article on the epiphytotic occurrence of [barley] yellow dwarf virus on oats, which caused about 12% loss in Iowa in 1959 [**39**, 301]. Yields in varietal trials at Doon in 1958 (disease-free) and 1959, when yellow dwarf was the only disease of consequence, were 73 and 57 bush./acre, respectively, in Putnam, 97 and 59 in Newton (the 2 most resistant vars.), 92 and 5 in Clintland, and 111 and 6 in Sauk (both highly susceptible).

Björkman (I.). **Experiments with cereal rusts on detached leaves in benzimidazole.**—*Bot. Notiser*, **113**, 1, pp. 82–86, 2 fig., 1960.

This method [**38**, 194] was tested at the Swedish State Plant Protection Inst., Svalöv. Ten races of oat crown rust (*Puccinia coronata*) [**39**, 292] were used. The most suitable conc. was 40 p.p.m. benzimidazole in horizontal dishes and 60 p.p.m. in tilted ones. The infection types appeared more clearly on the leaves in tilted dishes (angle 15°) than on the floating leaves, partly because the liquid moistened the new spores on the latter. Tilted dishes are also more suitable for the collection of dry spores. The advantages of the method are discussed.

Luke (H. H.), Wheeler (H. E.), & Wallace (A. T.). **Victoria-type resistance to crown rust separated from susceptibility to Helminthosporium blight in Oats.**—*Phytopathology*, **50**, 3, pp. 205–209, 2 fig., 1960. [21 ref.]

In joint studies by the U.S. Dept Agric., La State Univ., Baton Rouge, and Fla agric. Exp. Sta., Gainesville, further screening treatment with the toxin produced by *H. victoriae* [cf. **35**, 363; **39**, 303] was carried out, with the result that 18 Victorgrain and 54 Fulgrain fully resistant mutant types were selected. On testing with races 202, 203, 205, 290, and 216 of crown rust [*Puccinia coronata*: loc. cit.], only 2 exhibited resistance similar to that of the parent (Fulgrain, resistant to 4 of the races); they were resistant to 202 and 203 but possessed a lower type of resistance to 205 and 290. Therefore the relationship between crown rust resistance and *Helminthosporium* blight susceptibility appears not to be simple [cf. **28**, 390] but to be conditioned by a number of genes.

Brückner (F.). **Některé poznatky s mořením formalinem proti prašné sněti (Ustilago avenae [Pers.] Jensen).** [Some findings concerning formalin treatment against loose smut of Oats (*U. avenae*).]—*Ann. Acad. tchécosl. Agric.*, **32**, 8, pp. 1109–1116, 4 pl., 1 fig., 4 graphs, 1959. [26 ref.; Russ., Germ. summ. Abs. in *Landw. Lit. Tschechosl., 1959*, 3, p. 54, 1959.]

Good control was obtained from 'dry treatment' of oat seed with 0·3 l. of 5% formaldehyde or, if applied shortly before sowing, 0·2 l. of 7·5% formaldehyde/dz. [cf. **38**, 80], with which Hg compounds [**37**, 472], such as agronal (phenyl mercury bromide), might be combined. These chemicals did not affect germination, but their fungicidal effect decreased or vanished during a long storage.

Griffiths (D. J.) & Peregrine (W. T. H.). **Control of halo blight in Oats.**—*Plant Path.*, **9**, 1, pp. 10–14, 1 pl., 1960.

In seed treatment experiments at the Welsh Plant Breeding Station, Aberystwyth, 1956–57 the best control of halo blight (*Pseudomonas coronafaciens*) [**36**, 96] of oats was given by antibiotics, especially streptomycin (50 i.u./ml.), which also gave the most satisfactory seedling establishment and development.

None of the common European oat vars. showed much resistance, and only Cc 4146, an unidentified hexaploid form, possibly from *Avena sativa*×*A. ludoviciana*, gave evidence of a degree of resistance approaching immunity. The resistance of the American oat vars. Clinton and Cherokee was moderately high.

HARNACK (W.). **Labor- und Gewächshausversuche zur Prüfung der fungiziden Wirkung von Beizmitteln.** [Laboratory and greenhouse trials on the testing of the fungicidal action of disinfectants.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F. **13**, 11, pp. 206–210, 5 fig., 1 graph, 1959. [Russ., Engl. summ.]

The author describes modifications of Winkelmann's methods for the routine testing of cereal seed disinfectants [**17**, 51], developed since 1934 at the Versuchsstelle für Pflanzenschutz des VEB Berlin-Chemie, Teltow-Seehof. Petri dish tests permit the field performance of fungicides against *Tilletia* spp. to be estimated with reasonable accuracy. Against snow mould of rye (*Fusarium* [*Calonectria nivalis*]) Winkelmann's laboratory method [**12**, 755] is very effective for Hg products, but not for non-Hg.

Gassner's modification [**28**, 570] of Winkelmann's method for greenhouse testing of fungicides against *C. nivalis* is rejected in favour of the following: individual seeds are spaced out on a 2-cm.-deep layer of soil in a tray, an open-ended glass tube (6×2 cm.) is filled to the 2-cm. level by punching out a plug of soil from another similar tray, and this is placed over the grain and pressed to the base of the tray. On removal the tube thus contains a 4-cm. plug of soil with the seed embedded at its centre. These tubes are stored in large numbers in 10-cm.-deep boxes containing a 1-cm.-deep layer of moist sand. The sand is kept moist by watering through 4 'blank' tubes half-filled with paper pulp. This method gives results in 6 weeks, with considerable savings of greenhouse space and labour.

JAMALAINEN (E.). **Overwintering of Gramineae plants and parasitic fungi. III. Isolations of Fusarium nivale from gramineous plants in Finland.**—*Maataloust. Aikakausk.*, **31**, pp. 282–284, 1959. [Finn. summ.]

The results of determinations covering a period of many yr. have shown that *Calonectria graminicola* [*C. nivalis*] is the agent of snow mould of Gramineae [cf. **37**, 363]. It was isolated from a total of 72 samples of oats, rye, wheat, spelt (*Triticum spelta*), barley, *Dactylis glomerata*, *Festuca pratensis*, *Lolium multiflorum*, *L. perenne*, *Phleum pratense*, and *Poa annua*. *Fusarium avenaceum* also occurred in a total of 5 samples of rye and wheat.

GORTER (G. J. M. A.). **Breeding Maize for resistance to streak.** *Euphytica*, **8**, 3, pp. 234–240, 1 fig., 1959. [Dutch summ. 14 ref.]

The author (Dept Agric., Pretoria) reviews the history of breeding for resistance to maize streak virus disease [cf. **34**, 448] and notes the production in S. Africa of the commercial, streak-tolerant, 3-way hybrid S.A. 31, in which the resistance to streak derives from P×H maize. New sources of resistance have been found in Mexican maize, particularly the inbreds Urq. 54 and Mex. 37–5.

When susceptible vars. are crossed with P×H there is no marked reduction in total percentage infection in the F_1 compared with the susceptible parent, but severity is much diminished. The effect of infection upon the yield of these tolerant plants is only very slight. Thus, the tolerant 3-way crosses of P×H maize and high-yielding, susceptible single crosses provide a useful stop-gap in the long search for a resistant var.

SCHIEBER-HERBSTREUTER (E.). **Comparative morphology, host range and genetics of pathogenicity of Puccinia polysora and Puccinia sorghi from tropical areas.**—*Diss. Abstr.*, **20**, 6, p. 1953, 1959.

At the Univ. Wis. distinct morphological differences between *P. polysora* [**37**, 656]

and *P. sorghi* [**38**, 365] on maize and Guatemala grass (*Tripsacum laxum*: first record as host of *P. sorghi* under artificial inoculation) were apparent. Inbreeding through the *Oxalis* [**38**, 257] aecial host of single-uredospore cultures of *P. sorghi*, one from Puerto Rico (PR) and one from southern Indiana (P), produced aeciospore recombinant lines representing 8 pathogenic types (a to h) and 2 pathogenic types (a and b).

Inbred lines of maize (Cuzco 1 b, GG208R, B38, K 148, and Black's yellow dent), each with a dominant allelic gene pair at the locus on the short arm of chromosome 10 conditioning rust reaction, and Pop 35 and Pop 36 with a functional recessive, difactorial mode of inheritance (each susceptible to at least 2 isolates of *P. polysora*) were used to characterize the pathogenicity of the 2 cultures. Inbreds from PR clone showed a loss and a gain in pathogenicity in comparison with the mother clone: the pathogenic types were recovered in the hybrids between 4 recombinants. Original collections were heterozygous for pathogenicity factors. Temp. and uredospore viability were important factors in determining rust reaction in *P. polysora*.

Salunskaya (Mme N. I.) & Lopatin (V. M.). Про зараження Кукурудзи пухирчастою головнею. [On Maize infection by blister smut.]—Допов. Укр. Акад. сіл.-гос. Наук [*Dopov. Ukr. Akad. sil.-hos. Nauk*], **1**, 4, pp. 40–46, 1958. [Abs. in *Referat. Zh. Biol., 1960*, 3, p. 182, 1960.]

By dropping a sporidial suspension of blister smut [*Ustilago maydis*: **39**, 304] into leaf axils and sheaths of maize it was shown that different organs are infected in accordance with the stage of development at the time of invasion of the meristematic tissue. Plants at the shoot and 3–4 leaf stages are seldom infected, since spore germination is not favoured by spring temp. and spores are unlikely to fall on the growing point, which is protected by the sheath. Inoculation after flowering gave negative results. The large-scale appearance of smut and its development on the ripening cobs were mostly caused by infection during formation of the panicles. Heavy infection of young plants follows infection at the embryonic stage.

Cheremisinov (N. A.). Иммунологическое значение разнокачественности семян Кукурузы. [The immunological importance of heterogeneity in Maize seed.]—Науч. Докл. высш. Школ. [*Nauch. Dokl. vȳssh. Shkol.*], Biol. Sci., *1960*, 1, pp. 167–171, 1960.

In lab. and field tests at the Voronezh agric. Inst. in 1955–58, Voronezhskaya 76 maize seed from cobs at the top of the plant had the least (5·8%) blister smut [*Ustilago maydis*: cf. above], fusariosis, bacteriosis, etc. in contrast to that from the middle (11·3%) and the lower (23·5%) parts. Seed from the middle of the cob was 4·6% infected by *U. maydis*, as against 9·8% from the apex and 5·3% from the base. In 1958 2nd generation seed from the middle of the cob produced plants with 1·2% infection by *U. maydis* and 0·1% by *Fusarium* spp.

Yarchuk (T. A.). Местные сорта Кукурузы как материал для селекции. [Local Maize varieties as selection material.]—Кукуруза [*Kukuruza*], **4**, 12, p. 36, 1959.

The best hybrid in 1951 at the Kuban exp. Sta. of the All-Union Inst. for Plant growing, VIR 346 (Grushevskaya (No. 5049) × Krasnodarskiĭ 3), yielded 48 centners/ha. at 14% humidity in 1956, with only 2% blister smut infection [*Ustilago maydis*: cf. above]. This var. is recommended for extensive practical trials in the humid sectors of the Krasnodar area.

Leont'eva (Mme N.) & Voitovich (K.). О ноуэ методэ де комбатере а тэчунелуй бешикат ал Пэпушоюлуй. [A new method for the control of blister smut of

Maize.]—Агрик. витарит. Молдав. [*Agrik. viterit. Moldav.*], *1959*, 3, pp. 71–72, 1959. [Abs. in *Referat. Zh. Biol.*, *1960*, 1, p. 183, 1960.]

Laboratory and field experiments in Moldavia showed that 2,4-D, DNOC, and herbicide preparation 125 are toxic to spores of *Ustilago zeae* [*U. maydis*: cf. **37**, 473]. The most effective dose of 2,4-D for field control was 3 kg., 800 l./ha.

Rodigin (M. N.) & Rumyantseva (Mme Z. I.). Борьба с пузырчатой головней Кукурузы обработкой семян микроэлементами. [Seed treatment with micro-elements for the control of blister smut of Maize.]—Сел. Хоз. Поволжья [*Sel. Khoz. Povolzh'ya*], *1959*, 3, pp. 52–53, 1959. [Abs. in *Referat. Zh. Biol.*, *1959*, 22, p. 199, 1959.]

In tests in 1957–8 steeping maize seed for 6 hr. in 0·01% solutions of $MnSO_4$ and $ZnSO_4$ gave 53% reduction of blister smut [*Ustilago maydis*: cf. above] in vars. Saratovskaya and Kostychevskaya. Cob yield was increased by 13·8–16·5 centners/ha.

Nelson (R. R.). **The genetics of compatibility in Cochliobolus carbonum.**—*Phytopathology*, **50**, 2, pp. 158–160, 1960.

Further studies at N. Carol. State Coll., Raleigh [cf. **39**, 304], showed compatibility in *C. carbonum* to be controlled by 1 major gene locus. Of 489 monoascospore isolates 256 were of compatibility group *A* and 233 of *a*; ascus progenies also segregated 1:1 for compatibility. Varying compatibility among conidial isolates from maize and differences in backcross fertility of ascospore isolates suggests that other genes, some acting as incompatibility factors, influence the compatibility locus. A complex compatibility locus or additional incompatibility factors may account for failure to determine the compatibility reaction of some of the conidial isolates. The similarity between *C. carbonum*, *C. sativus*, and *C. heterostrophus* [**39**, 395] in their basic patterns of sexuality suggests the possibility of interspecific crosses.

Vanderweyen (A.). **Une troisième helminthosporiose du Maïs au Congo belge.** [A third helminthosporiosis of Maize in the Belgian Congo.]—*Parasitica*, **16**, 1, pp. 7–13, 2 fig., 1960.

At I.N.E.A.C., Yangambi, Belgian Congo, a black rot of maize confined to the ear, discovered in the provinces of Katanga and Kasai in 1958, was shown to be caused by *Helminthosporium carbonum* [cf. **37**, 350 and above].

Robert (Alice L.). **Physiologic specialization in Helminthosporium turcicum.**—*Phytopathology*, **50**, 3, pp. 217–220, 1960.

At U.S. Dept Agric. [Beltsville, Md] 27 isolates of *H. turcicum* [cf. **38**, 405] from 18 States of the U.S.A., Italy, S. Africa, and Egypt were tested on 8 inbred lines of maize, 2 vars. each of sorghum (Leoti and Atlas) and Sudan grass (Sweet and Tift), and 1 selection of Johnson grass [*Sorghum halepense*] by spraying potted plants in the greenhouse with a culture suspension. There was evidence of physiologic specialization on maize, though not sufficiently clear cut to designate races, and on the other hosts 9 different infection types were recognized. Maize isolates did not infect sorghum, nor vice versa [cf. **3**, 29]. Geographic origin apparently has no influence on virulence.

Vanderweyen (A.). **Préparation en laboratoire de grandes quantités d'inoculum de Diplodia zeae.** [The preparation in the laboratory of large amounts of inoculum of *D. maydis*.]—*Parasitica*, **16**, 1, pp. 14–15, 1960.

Standard inoculum for testing the resistance of maize to *D. maydis* was obtained at I.N.E.A.C., Belgian Congo, by a modification of Ullstrup's method [*Phyto-*

pathology, **38**, p. 27, 1948]. Erlenmeyer flasks (1 l.) with 200 g. unhusked rice 200 ml. water were inoculated from potato dextrose agar cultures and after about 1 month these were shaken in 200 ml. water and the resultant spore suspension diluted as necessary. Inoculation with a Gandajika syringe [see below], using 1 ml./plant of a suspension of 5,500 spores/cu. mm., gave satisfactory infection.

Vanderweyen (A.). **Nouvelle seringue d'inoculation pour diverses maladies des plantes.** [A new inoculation syringe for various plant diseases.]—*Parasitica*, **16**, 1, pp. 16–17, 1 fig., 1960.

This 'Gandajika' syringe, designed to inoculate maize plants with various parasites, such as *Diplodia zeae* [*D. maydis*: cf. above], consists of a hollow, bronze cylinder of 22 mm. internal diam. and 13 cm. long with a plunger, the rotation of which allows the quantity of fluid released to be regulated with great precision.

Foley (D. C.). **The response of Corn to inoculation with Diplodia zeae and Gibberella zeae.**—*Phytopathology*, **50**, 2, pp. 146–150, 2 fig., 1960.

At Iowa State Univ., Ames, maize vars. were inoculated in July and Aug. 1956 at the node or internode and in 1957 at the internodes only by insertion of an oat kernel infested with either *D. zeae* [*D. maydis*] or *G. zeae* and observations made on the degree of subsequent discoloration in the stem and the extent of stalk breakage, natural and induced, in Sept.–Oct. [cf. **39**, 168]. In 1956 *D. maydis*, but not *G. zeae*, caused small increases in breakage; in 1957 neither did. Inoculation did not generally reproduce the syndrome found in naturally affected plants; it induces discoloration which does not occur in unwounded diseased plants. Stalk weakening rather than degree of discoloration appeared to be the best index of inherent susceptibility to stalk rot. This weakening is due to the action of micro-organisms, but a suitable method of increasing it artificially is lacking and there is at present no method known of obtaining maize plants entirely free from naturally occurring pathogens

Miczyńska (Zofia). **Gibberella saubinetti na Kukurydzy.** [*G. zeae* on Maize.]—*Acta agrobot.*, **8**, pp. 245–248, 4 fig., 1959.

Though the conidial state, *Fusarium graminearum* [cf. **38**, 141], was known on maize and cereals in Poland, the perithecial state is here recorded for the 1st time and described.

Thayer (P.) & Williams (L. E.). **Effect of nitrogen, phosphorus, and potassium concentrations on the development of Gibberella stalk- and root-rot of Corn.**—*Phytopathology*, **50**, 3, pp. 212–214, 1 graph, 1960.

At Ohio agric. Exp. Sta., Wooster, maize plants were grown in mineral-salt gravel cultures and were either inoculated at 9 weeks above and below the ear shank with *G. roseum* f. *cerealis* [**38**, 513] or the pathogen was added to the gravel at 3 weeks. N was supplied at 3, 110, or 330 p.p.m., P at 0, 10, or 100, and K at 8, 120, or 360. An increase in K reduced stalk rot when N was low, had no effect at medium N, and increased it at high N. With low K, N levels had no effect, but at medium and high K, increased N caused more stalk rot [**39**, 103]. N and K differences had no apparent influence on root rot; both root and stalk rot were reduced by high P.

Gerasimov (B. S.) & Leont'eva (Mme Y. A.). Новые химические средства для борьбы с вредителями и болезнями Кукурузы. [New chemical substances for the control of pests and diseases of Maize.]—Сел. Хоз. Поволжья [*Sel. Khoz. Povolzh'ya*], *1958*, 12, pp. 66–67, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 23, p. 221, 1959.]

Thiram with heptachlor or with dieldrin (2–3 kg./ton) is recommended for treat-

ment of maize seed against *Fusarium* [**39**, 468] and *Penicillium* spp. Even in dry weather with 10·2 wireworms per sq. m. thiram+heptachlor increased field germination 26%, thiram—dieldrin 11%, and granosan +BHC 3% in comparison with untreated seed. Yields were 30·4, 26·6, and 23·6 centners/ha., respectively, as against 21·2 from untreated seed.

Vasyl'chenko (V. F.). Вплив нативних антибіотиків актиноміцетного походження на схожість та ураження фузаріозом насіння Кукурудзи. [The effect of indigenous antibiotics derived from actinomycetes on the germination and susceptibility of Maize seeds to fusariosis.]—Вісн. Київськ. Унів. [*Visn. Kyjivs'k. Univ.*], Ser. biol., *1958*, 1, pp. 109–114, 1958. [Russ. sum. Abs. in *Referat. Zh. Biol.*, *1960*, 2, p. 187, 1960.]

From composts and soils of the Soviet Union and China [**37**, 21] 900 actinomycete strs. were isolated, of which 123 proved to be antagonistic to 4 spp. of *Fusarium*, [cf. above], isolated from germinating maize. The antibiotics from these actinomycetes penetrate the seed coat and can be detected in the embryo within 4–6 hr. if the seed is steeped in cultural liquid. For this reason they are recommended for steeping infected seed. The most active str., *Actinomyces rochei* (str. 1327), produces antibiotics which completely disinfect maize seed, increase germination, and stimulate growth.

Qasem (S. A.-F. A.). **Studies on deterioration of stored Corn by fungi.**—*Diss. Abstr.*, **20**, 6, pp. 1952–1953, 1959.

In further studies at Univ. Minn. [**38**, 203] maize became invaded by storage fungi (via the point of attachment of kernel to the cob in uninjured kernels). After several months' storage there were many ochre-coloured embryos [**39**, 167] in all lots of grade No. 2, all invaded by storage fungi, mainly members of the *Aspergillus glaucus* group. In conditions favouring fungal development rate of deterioration of No. 2 corn was in general proportion to the mould count, the percentage of dead kernels, and discoloured embryos. Nearly all lots of grade No. 2 corn from commercial storage bins deteriorated faster than inoculated high grade corn at lower temp. and moisture contents. *A. restrictus* will invade, kill, discolour, and cause blue-eye [cf. **38**, 741] when moisture content is 14% or just below: at favourable moisture contents deterioration is greater at 30° C. than at 15° or 20°, but it will continue slowly even at 10°. Deterioration at supposedly uniform and safe storage moisture contents is due to variations of 1·5–2% above or below av. in individual kernels. *A. restrictus* was isolated and identified from surface disinfected kernels even in the presence of the *A. glaucus* group by plating on a medium consisting of 20 g. agar, 180 g. NaCl, and 890 g. water.

Outbreaks and new records.—*F.A.O. Pl. Prot. Bull.*, **8**, 2, p. 22, 1959.

An outbreak of 'hoja blanca' virus disease of rice [cf. below; map 359] in the Belize area, British Honduras, during 1959 is reported by the Director of Agriculture.

Hoja blanca found in Louisiana. Hoja blanca in 7 parishes in Louisiana.—*Rice J.*, **62**, 10, p. 18; 12, p. 17, 1959.

'Hoja blanca' and its vector, *Sogata orizicola* [**39**, 469], appeared during 1959 near Covington, La.

In the 2nd paper the disease, or the vector, or both are stated to have been found on 21 properties involving 4,674 acres. All the fields in the rice-growing section of the Mississippi south of Highway 190 are likely to become infested with the vector almost immediately. Fields are being treated with 1 lb. malathion+1 lb. DDT/3 gal. water, or (if nearing harvest) with 0·5 lb. phosdrin/acre. Rice from vector-infested fields that is to be moved into the main rice-producing belt is being fumigated.

Samuel (R.), Izquierdo (S.), & Davis (W. C.). **Living with hoja blanca at Arrozal Bartes, S.A.**—*Rice J.*, **61**, 7, p. 16, 1 fig., 1958.

In Cuba 200 rice lines have been selected from Century Patna 231 × Zayas Bazán, both resistant to 'hoja blanca' virus disease [cf. **36**, 552; **38**, 81]. Similar lines from Bluebonnet 50 × Zayas Bazán have various degrees of resistance. Zayas Bazán is not unaffected, but it produces well even when 15% of the stems have symptoms. Substantial field plantings of Lacrosse, R-500 (Magnolia × Lacrosse), and Colusa had no disease losses. In Cuba late Nov., Dec., and (perhaps) the 1st 10 days of Jan. are comparatively successful planting dates for Bluebonnet 50 and Century Patna 231. Two years' plantings within this range of dates gave yields averaging over 1,000 ql./caballeria, though seedlings throughout the rest of the year were commercial failures as a result of infection. Satisfactory kills of the vector, *Sogata orizicola* [cf. above], were given by malathion 2½ gal. in 155 gal. water caballeria. The ground must be covered with water while spraying is being done.

Smith (G. T.). **Two promising Rice selections get 'outfield' tests in Texas.**

Crane (L. E.). **New Rice variety, 'Gulfrose', introduced.**—*Rice J.*, **26**, 5, p. 8, 1 fig.; 13, pp. 2–3, 17, 2 fig., 1959.

Field experiments by the Rice Pasture Exp. Sta., Beaumont, Texas, showed that the cereal introduction CI 9416, from a cross between Bruinmissie and Zenith, and the plant introduction PI 215936, a short-grained Hoari type from Formosa, were resistant to 'hoja blanca' virus [cf. above]. CI 9416 has now been released under the name Gulfrose.

Nuove razze di Riso. [New Rice vars.]—*Progr. agric.*, **6**, 2, pp. 234–235, 1 col. pl., 1960.

Roncarolo precoce has av. resistance to foot rot (*Fusarium* sp.) [*Gibberella fujikuroi*: **39**, 469], collar rot (*Piricularia* sp.) [*P. oryzae*: loc. cit.], and basal necrosis of the culm (*Sclerotium* sp.) [*Leptosphaeria salvinii*: loc. cit.], and high resistance to 'brusone' (*Helminthosporium* sp.) [*Ophiobolus miyabeanus*: loc. cit.]. Balocco has av. resistance to both 'brusone' and collar rot.

Williams (F. J.). **Arkansas research.**—*Rice J.*, **62**, 7, pp. 56–57, 60–65, 69–73, 1959.

In this report (p. 64) E. M. Cralley concludes from tests that treating Toro rice with chipcote 75, ceresan 100, and arasan (of 7 chemicals tested) and seeding in water gave increases in stand. Among 225 vars. tested, some of the promising rice selections showed greater tolerance of stem rot (*Leptosphaeria salvinii*) [**38**, 257] than the principal commercial vars. now in use; higher rates of K fertilizers in relation to N tended to reduce the severity of stem rot.

T. H. Johnston notes that late high N apparently favoured infection by *Piricularia* [*oryzae*] and increased blast damage [**39**, 78]. At the Southeast Branch Sta. Sunbonnet yielded only 12 bush./acre because of severe straighthead [**38**, 742; **39**, 103], compared with 82 bush. for Bluebonnet 50 and 108 bush. for an experimental var. of similar maturity.

Kulkarni (N. B.). **Blast disease of Rice in Bombay State.**—*Poona agric. Coll. Mag.*, **50**, 1, pp. 8–29, 4 fig., 1 map, 1959. [84 ref.]

Blast disease of rice (*Piricularia oryzae*), 1st reported in India in 1920 where it caused 69% damage in Madras, was responsible for disastrous epiphytotics in 1948–9 and 1949–50 in Bombay, with losses in the 1st season of 29–66% (over Rs. 5,000,000). The primary source of infection has been traced to seed imported from diseased localities, infested soil, and infected plant debris.

The cost of fungicidal treatment/acre, including seed treatment, seed-bed treat-

ment, pre-transplanting, dipping, and spraying at flowering, was estimated in 1954 to be Rs. 14.8.3. for Bordeaux 3:3:50 and Rs. 25.7.3. for perenox at 3 lb./100 gal. water, the former proving also more effective.

KULKARNI (N. B.), PATEL (M. K.), & DESAI (M. K.). **Physiologic specialization in Piricularia oryzae Cav. in India.**—*Poona agric. Coll. Mag.*, **49**, 4, pp. 227–231, 1959. [31 ref.]

Isolates of *P. oryzae* [cf. **27**, 581; **34**, 105], 1 each from Bombay, Madras, and Cuttack, were of 3 physiologic races: virulent, intermediate, and weak.

WAGNER (R.). **A mikroklíma hatása a Rizs megbetegedésére.** [The effect of the microclimate on Rice disease.]—*Mag. Tud. Akad. Agrártud. Oszt. Közl.*, **14**, 1–3, pp. 234–242, 255–279, 1958. [Abs. in *Referat. Zh. Biol., 1959*, 22, p. 199, 1959.]

Experiments in 1956–7 at Kopáncz, Hungary, showed that reduction of water temp. in rice fields, and the ensuing speedy reduction of soil temp., lasting for several days, leads to an intensification of rice diseases. On a plot with water temp. 10–15° [C.] and soil temp. 8–10° below that of the control, var. Ömirt 39 was 34·8% infected by *Piricularia oryzae* [**37**, 161], while the control plants were only 13·5% infected. *Pseudomonas oryzicola* [loc. cit.] infection was 3·4%. Similar results were obtained for the var. Dubovskiĭ 129.

ASADA (Y.) & TACHIBANA (T.). **Studies on the susceptibility of akiochi (autumn declined) Rice plants to Helminthosporium blight. (X). Some physiological observations on the diseased Rice plants affected with Cochliobolus miyabeanus. (Part 2.)**—*Ann. phytopath. Soc. Japan*, **24**, 4, pp. 213–218, 1 fig., 2 graphs, 1959. [Jap. Abs. from Engl. summ. 29 ref.]

In further studies at Coll. Agric., Ehime Univ., Matsuyama [cf. **39**, 307], the amount of protein N in concentric leaf pieces 4, 8, and 12 mm. diam. removed from diseased spots 2, 4, and 6 days after inoculating normal and akiochi rice plants with *C. miyabeanus* increased in the early stages of infection in the normal leaves only. With paper electrophoresis the 3 optical density peaks (α, β, and γ) in the leaf proteins were present in the normal leaves up to at least 6 days after infection, but in the akiochi leaves the β peak disappeared 2–6 days after infection. The Zn content of the diseased spots 6 days after inoculation (determined by the dithizone A.O.A.C. method) was lower in the diseased part of both normal and akiochi leaves than in the healthy part and the difference between healthy and diseased areas was more marked in the akiochi plants, suggesting the transference of Zn in diseased leaves from the diseased part to the healthy.

FANG (C.-T.) & REN (H.-C.). **Further studies on the relationship of Leersia spp. with the bacterial leaf blight and the bacterial leaf streak disease of Rice.**—*Acta phytopath. sinica*, **5**, 2, pp. 100–110, 1959. [Chin. Abs. from Engl. summ.]

These confirm that leaf blight of rice (*Xanthomonas oryzae*), leaf blight streak of rice (*X. oryzicola*), and leaf streak of *L.* spp. (*X. leersiae*) are distinct [**37**, 475]. Furthermore, 2 similar isolates, viz. 57–0–722 from rice from Nankin and LS-9 from *L. hackeleii* from Hongchow, appeared to constitute a new sp. *X. leersiae*, known to occur on *L. hexandra*, was newly noticed on *L. japonica* and *L. hackeleii* in E. and Central China.

QUEBRAL (F. C.) & GIBE (L. N.). **Cercospora leaf spot of Sorghum.**—*Philipp. Agric.*, **43**, 4, pp. 271–280, 3 fig., 1959.

A detailed account is given of *Cercospora sorghi* [**38**, 258] in culture, susceptibility and resistance of sorghum vars., and control measures including phytosanitation,

rotation, and seasonal timing of the crop. At the Central Exp. Sta., Laguna, the most resistant vars. were Martin, Cluster, Hegair, Caprock, Pygmy, Top sorghum, and Pink, African, Rice, and Sharon Kafirs. Johnson grass [*Sorghum halepense*] proved susceptible to inoculation.

Liang (P. Y.), Lee (Y. L.), & Shen (L. M.). **Studies on Millet blast caused by Piricularia setariae Nishikado.**—*Acta phytopath. sinica*, **5**, 2, pp. 89–99, 4 graphs, 1959. [Chin. Abs. from Engl. summ.]

Investigations by Peking Univ. Agric. in Shangtun in 1958–9 showed that the primary sources of *P. setariae* infection [cf. **37**, 442] are seed and straw bearing the fungus. Treatment of seed with 0·3% ceresan reduced the occurrence of blast in seedlings from 80 to 30% in 1 var. and from 13·3 to 6·6% in another. Muli and Huanun No. 4 were highly susceptible; No. 322 and Ginshientz relatively resistant during the growth period; Shiaohuango, Paimuchi, No. 231, and Shansidayieh resistant at the seedling stage but susceptible at heading; and Dapaigo, No. 611, and Titoupeng susceptible as seedlings but resistant at heading. In general, densely planted fields (6,000 plants/mou) were attacked more severely than thinly planted (3,000–5,000/mou), the respective ratios of the disease indexes ranging from 1:1·7 to 1:6; late sowing diminished incidence. Dew stimulated development, the opt. conditions being a dew quantity above 350 mg./25 sq. cm. (or not less than 2·5 mm. rain), R.H. above 75%, and temp. about 25·5° C.

Sinclair (J. B.) & Brown (R. T.). **Effect of exocortis disease on four Citrus rootstocks.**—*Plant Dis. Reptr*, **44**, 3, pp. 180–183, 1960.

Observations from 1955–59 by La agric. Exp. Sta., Baton Rouge, showed that scions of Washington navel orange, infected by [citrus] exocortis [virus: **39**, 104 and below] and budded on to sweet orange, trifoliate orange, and Rangpur lime stocks in 1951–2 bore less fruit than those of healthy trees, but no reduction in yield was noticed on Cleopatra mandarin stock. When infected, the scions on all 4 rootstocks exhibited progressively slower increase of trunk circumference, an indication of the virosis in Cleopatra mandarin and sweet orange, which otherwise remained free from typical scaling symptoms. Sweet orange appeared to be more affected than Cleopatra mandarin.

Sinclair (J. B.), Horn (N. L.), & Brown (R. T.). **Two important diseases of Citrus in Louisiana.**—*Proc. La Acad. Sci.*, **21**, pp. 70–75, 1958. [13 ref.]

The information on *Oospora* fruit rot of citrus in Louisiana has been noticed [*Geotrichum candidum* var. *citri-aurantii*: **37**, 478]. Studies at the agric. Exp. Sta., Baton Rouge, on exocortis virus disease [see above] indicated that symptoms were most pronounced on Rangpur lime. The differences in trunk circumference measurements taken 6 in. above the bud union over 3 yr. on healthy and diseased Rangpur lime, sweet orange, and Cleopatra mandarin decreased in that order.

Fraser (Lilian R.). **Woody gall, a suspected virus disease of Rough Lemon and other Citrus varieties.**—*Proc. Linn. Soc. N.S.W.*, **84**, 391 (*1959*), 3, pp. 332–334, 1 pl. (5 fig.), 1960.

The woody galls observed by New South Wales Dept Agric. on rough lemon stock and occasionally on Eureka lemon and sour orange [**39**, 72] originate at cambial level in the form of outward growing cones of various sizes from simple rounded swellings on younger wood to large complex bark-covered knobs on the main branches and trunk. The disease, which was transmitted to rough lemon by budding and induced symptoms in 18 months, is not transmitted through seed. It is believed to be a virosis and the name [citrus] woody gall virus is proposed.

CONTENTS

AUTHORS' NAMES

Alicbusan, 524
Anderegg, 550
Anderson (C. A.), 543
Anderson (H. W.), 526
Ark, 552
Arny, 566, 567
Asada, 575
Attisso, 552
Balul, 529
Banttari, 567
Barry, 543
Beadle, 558
Bekker, 554
Bennett, 518, 519
Beraha, 526
Bercks, 516
Björkman, 564, 568
Bochow, 513
Boedijn, 556
Bond, 553
Bonnier, 540
Booth, 557
Boswell, 527
Bottini, 552
Boullard, 548
Brann, 526
Bratus', 542
Breese, 561
Brown, (J. C.) 523
Brown, (R. T.) 576
Browning, 568
Brubaker, 518
Brückner, 568
Buchanan-Davidson, 514
Burchfield, 543
Burkholder, 529
Buxton, 520
Bywater, 521
Calvert, 523
Campbell, 527
Canova, 519
Cappellini, 552
Castellani, 524
Chang, 517
Chase, 544
Cheo, 517
Cheremisinov, 570
Chevaugeon, 558
Chinte, 560
Chiu, 517, 528
Clowes, 558
Coats, 550
Coudriet, 518
Courshee, 545
Crane, 574
Crosier, 565
Crowdy, 551
Croxall, 513
Cummins, 556
Curl, 553
Da Costa, 555
Dale, 564
Davis (B. H.), 552
Davis (W. C.), 574
De Berchoux, 524
De Núñez, 552
Desai, 575
Diener, 524
Diercks, 546
Dimond, 537
Dobson, 527
Doolittle, 527
Dupias, 556
Dye, 540
Efimov, 539
Eletskaya, 520
Ercolani, 523
Esau, 518
Ewing, 521
Falchieri, 544
Fang, 575
Fassi, 548
Faurel, 515
Feltz, 518
Fennell, 559
Fields, 550
Fischer, 538
Flamini, 519
Foley, 572
Forsyth, 565
Fraser, 576
Frey, 568
Fribourg, 553
Fuchs, 514
Fulton, 538
Fumagalli, 566
Gabriel, 540
Gambogi, 532
Gandy, 530
Garrigues, 515
Gärtel, 531
Gerasimov, 572
Gibe, 575
Giddings, 518
Gillespie, 543
Goch, 563
Goldberg, 550
Gonter, 543
Gorter, 569
Goryushyn, 517
Grainger, 553
Green (A. T.), 551
Green (C. H.), 528
Griffiths, 568
Grove, 551
Grula, 540
Gupta, 549
Gusakova, 548
Hang, 517
Harnack, 569
Hart, 538
Hayes, 558
Heitefuss, 514
Henao, 562
Hesseltine, 557
Hickman, 521
Hills, 518, 519
Holton, 538
Horn, 576
Horsfall, 537
Hsieh, 517
Hull, 516
Hwang, 528
Ikäheimo, 566
Imshenetskil, 538, 548
Iren, 525
Izquierdo, 574
Jacks, 525
Jackson, 529
Jamalainen, 569
Jaques, 544
Jennings, 529
Jewell, 518, 519
Johansson, 534
Johnson, 553
Johnston, 536
Joseph, 517
Kanaeva, 539
Kane, 543
Káš, 553
Kaul, 525
Keener, 556
Keitt, 553
Kenneth, 566
Kern, 556
Kerssen, 517
Khokhlov, 551
Khristov, 545
Kingsley, 523
Kirchoff, 549
Kiss, 559
Klement, 522, 539
Kochetova, 528
Kononenko, 553
Körnlein, 545
Korotkova, 531
Kostić, 565
Kotev, 546
Kovács, 544
Kovylkina, 548
Krasil'nikov, 551
Krexner, 520
Krusheva, 555
Kudryavtsev, 556
Kulkarni, 574, 575
Laird, 541
Lawrence, 555
Leben, 553
Lederberg, 558
Lee, 576
Lefort, 558
Lehoczky, 522, 526
Leifson, 539
Leont'eva (N.), 570
Leont'eva (Y. A.), 572
Liang (P. Y.), 576
Liang (S. S.), 528
Linn, 526
Lisk, 543
Lopatin, 570
Lovas, 539
Lubani, 526
Ludwig, 567
Luke, 568
Lukashevich, 539
MacDougall, 543
Madaeva, 548
Majerník, 530
Maklakova, 513
Malaguti, 563
Martinez, 560
Marx, 518
Mathur, 526
Matto, 550
Matyshevs'ka 539
Mayagoitia, 531
Mayer, 541
Mayor, 554
McCallan, 538
McCloskey, 551
McKnight, 546
McLean, 515
McMeekin, 514
Meagher, 543
Mel'nikova, 542
Men'shova, 548
Miczyńska, 572
Miyamoto, 563
Montemartini, 557
More, 567
Moreau, 558
Moritz, 546
Morrison, 551
Mumford, 541
Münster, 517
Murakishi, 527
Nakagawa, 563
Nakov, 546
Nash, 522
Nelson, 571
Newhall, 526
Niklaus, 515
Nishio, 563
Nitzany, 528, 566
Noll, 519
Nordby, 545
Noronha, 555
Nosek, 553
Nour, 560
Novák, 553
Novikova, 548
Novotny, 543
Nyuksha, 547
Okhova, 539
Orlob, 567
Owens, 543
Parès, 552
Patel, 575
Patino, 522
Peregrine, 568
Peri, 544
Perry, 520
Person, 565
Peters, 568
Peturson, 565
Peyronel, 548
Pimenova, 513
Pirson, 566
Pound, 566
Pozhar, 520
Prakken, 558
Prasad, 530
Prota, 559
Pultz, 527
Qasem, 573
Quebral, 575
Rangaswami, 552
Ren, 575
Revilla, 524
Reyes, 560
Richardson, 521
Robert, 571
Robinson (J. B.), 544
Robinson (R. A.), 557
Rodigin, 571
Rudnev, 542
Rumyantseva, 571
Ruzinov, 539
Rybalkina, 553
Ryzhkova, 548
Sal'nikova, 523
Salunskaya, 570
Samborski, 565
Samuel, 574
Sarger, 540
Schade, 561
Schafer, 524
Schieber, 566
Schieber-Herbstreuter, 569
Schlegel, 561
Sehgal, 526
Seibel, 545
Serbulov, 539
Sevost'yanov, 520
Shemyakin, 551
Shen, 576
Silverman, 564
Simon, 565
Simons, 527
Sinclair, 576
Singh (G. P.), 566
Singh (R. D.), 530
Singer, 554
Sinha, 564
Sitterly, 529
Smilyanets, 539
Smith (G.), 537
Smith (G. T.), 574
Smith (S. B.), 543
Snyder, 522
Soga, 563
Spencer, 567
Sprague, 555
Stahmann, 514
Stalder, 515
Staněk, 522
Steenberg, 545
Stellmach, 516
Sukhov, 559
Suprun, 554
Tachibana, 575
Tanrisever, 519
Tape, 552
Tatarenko, 549
Tatum, 558
Taylor (A. L.), 527
Taylor (J.), 527
Templeton, 564
Ter Horst, 524
Thayer (P.), 572
Thayer (P. L.), 526
Thompson, 552
Thrower, 562
Tiffin, 523
Timofeeva, 548
Tousson, 522
Trautman, 561
Treggi, 532
Tsao, 553
Uehara, 522
Ujević, 522
Uzcanga (A.), 531
Uzcanga (C.), 531
Unwin, 567
Valenta, 562
Vanderweyen, 571, 572
Van Doorn, 524
Van Dorst, 527
Van Koot, 527
Vasyl'chenko, 573
Venkatakrishniah, 526
Verona, 557
Vlasov, 559
Voitovich, 570
Voznyakovskaya, 548
Wagner, 575
Walker, J., 522
Walker (J. C.), 514
Wallace, 568
Watanabe, 563
Weber, 529
Wenham, 515
Wheeler, 568
White, 549
Whitehead, 523
Wiesner, 516
Williams (F. J.), 574
Williams (L. E.), 572
Williams (L. F.), 523
Yamaguchi, 561
Yang, 515
Yarchuk, 570
Yarwood, 560
Yeager, 541
Yoshii, 560
Zaumeyer, 522
Zelepukha, 542

SUBJECT INDEX

Actinomycetes, 573
Airborne fungi, 524
Antibiotics, **550–553,** 573
Bacteria, 513, 523, 529, 535, 539, 540
Books, 533, 537, 538, 539, 542, 548, 550, 553, 556, 558
Deficiency diseases, 531, 534
Diseases and disorders of:
  Apple, 533, 535
  Banana, 536
  Cacao, 536, 537, **562–563**
  Cereals, 535, 536, **564–573**
  Citrus, 536, 537, 576
  Coconut, 535
  Cotton, 536
  Flowers and ornamentals, 533
  Foodstuffs, 550
  Fruit, 533, 535
  Groundnut, 524
  Herbage crops, 575–576
  Insects, 540, 541
  Mushrooms, 530
  Paper pulp, 546
  Potato, 532–533, 535
  Rice, 536, 537, **573–575**
  Sugar beet, **516–520**
  Tobacco, 532
  Tomato, 534
  Trees and timber, 534
  Vegetables, **513–515, 520–523, 524–530,** 533, 534, 539
  Vine, 530–531
Fungicides, 539, **541–546,** 569
General publications, **533,** 534, 536, 538, 546, 548
Genetics, 558, 563
Hormones, 540
Industrial and officinal fungi, 547
Legislation, 541, 547
Lists of fungi or diseases, 536, 554, **555, 557,** 564
Mycorrhiza and symbiosis, 548
Physiology, 514, 523, 534, **548–550,** 558, 559, 561, 571
Radiation, 545, 550
Reports from Canada, 534; Plant Breeding Institute, Cambridge, 563; Surinam, 537; Switzerland, 531
Root rots, 513, 534, 536
Smoke pollution, 546
Soils and fertilizers, 553
Systematic mycology, 529, 537, 554, **556–557,** 572
Technique, 523, 539, 553, 559, 572
Virus diseases, 513, **516–519,** 522, 524, 527, 528, 529, 535, **559–562,** 563, 564, 566, 567, 568
Yeasts, 556, 557, 558

Also obtainable from the

COMMONWEALTH MYCOLOGICAL INSTITUTE

DISTRIBUTION MAPS OF PLANT DISEASES

A series of maps showing world distribution. Issued at the rate of two maps each month. Annual subscription 7*s.* 6*d.* post free. Back issues, in series, 6*d.* each; odd numbers 9*d.* each, postage extra. Loose-leaf binders for the maps are now available, price 20*s.*, postage extra. Maps 1 to 369 available to the end of 1959.

COMMONWEALTH PHYTOPATHOLOGICAL NEWS

A quarterly giving news and views of current phytopathological matters in the Commonwealth. Annual subscription 5*s.* post free. Single numbers 1*s.* 6*d.*

PHYTOPATHOLOGICAL PAPERS

No. 1. LOSSES CAUSED BY PLANT DISEASES IN THE COLONIES. By G. Watts Padwick. 60 pp., 28 fig., 1956. 10*s.*

No. 2. WITCHES' BROOM DISEASE OF CACAO. By R. E. D. Baker and Paul Holliday. 42 pp., 14 plates, 10 fig., 1957. 12*s.* 6*d.*

No. 3. CLUB ROOT DISEASE OF CRUCIFERS CAUSED BY PLASMODIOPHORA BRASSICAE WORON. By John Colhoun. 108 pp., 4 fig., 1958. 20*s.*

Issued at irregular intervals. Until further notice a rebate of 33⅓ per cent. is allowed on new Papers to those who register for all numbers as issued, the charge to subscribers to the *Review of Applied Mycology* being added to their subscriptions for the succeeding year, others being billed annually.

MANUAL OF RICE DISEASES. By G. Watts Padwick. 198 pp., 48 fig., 1950. 30*s.*

LEAF CURL DISEASE OF COTTON. By S. A. J. Tarr. 55 pp., 12 pl., 1951. 12*s.* 6*d.*

FUNGI AND PLANT DISEASES IN THE SUDAN. By S. A. J. Tarr. 127 pp., 75 fig., 1955. 25*s.*

TOBACCO DISEASES. By J. C. F. Hopkins. 204 pp., 59 pl., 1956. 35*s.*

THE REVIEW OF APPLIED MYCOLOGY

The subscription to the *Review* for the current volume is 70*s.* per annum, post free, payable in advance. Back volumes can be supplied, but the price is 80*s.* per volume, postage extra, with the exception of a few parts, which are out of print. Microfilm copies of the volumes out of print can be supplied to order.

Foreign subscribers should pay by International Money Order or through the British Agents of their Bankers.

Orders and correspondence should be addressed to the Director, Commonwealth Mycological Institute, Ferry Lane, Kew, Surrey.

The Commonwealth Agricultural Bureaux organization does not accept responsibility for any trade advertisements included in this publication.

The Executive Council of the Commonwealth Agricultural Bureaux is a signatory to the Fair Copying Declaration, details of which can be obtained from the Royal Society, Burlington House, London, W.1.

© *Commonwealth Agricultural Bureaux, 1960.*